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LED LCD TV
SERVICE MANUAL

CHASSIS : LD2AC

MODEL : 32LT360C 32LT360C-ZA

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

P/NO : MFL67368103 (1205-REV00)

Printed in Korea

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

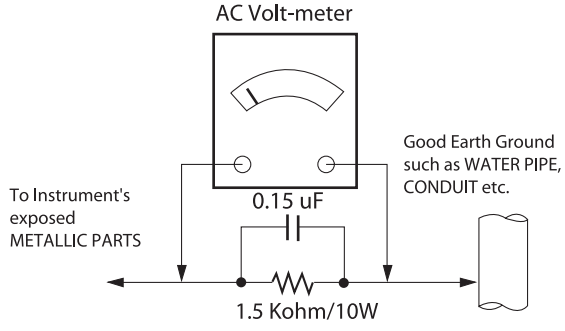
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

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IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device
Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
   Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LD2AC chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC specification
   - EMC : CE, IEC

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-36Countries)	**DTV & Analog (Total 36 countries)** **DTV (MPEG2/4, DVB-T) :** 36 countries UK/ Italy/ Germany/ France/ Spain/ Sweden/ Finland/ Netherlands/ Belgium/ Luxemburg/ Greece/ Denmark/ Czech/ Austria/ Hungary/ Swiss/ Croatia/ Turkey/Norway/ Slovenia/ Poland/ Ukraine/ Portugal/ Ireland/ Morocco/ Latvia/ Estonia/ Lithania/ Rumania/ Bulgaria/ Russia/ Slovakia/ Bosnia/Serbia/ Albania/ Kazakhstan **DTV (MPEG2/4, DVB-C): 11 countries** Sweden/ Finland/ Austria/ Swiss/ Germany/ Netherlands/ Hungary/ Slovenia/ Norway/ Denmark/ Bulgaria
2.	Broadcasting system	1) PAL-BG 2) PAL-DK 3) SECAM L/L' 4) DVB-T//C	Programme coverage VHF: E2 to E12, UHF : E21 to E69 CATV : S1 to S20, HYPER : S21 to S47
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM , QAM	► DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM
4	Scart Jack (1EA)	PAL, SECAM	Scart 1 Jack is Full scart and support RF-OUT(analog).
5	Component Input (1EA)	Y/Cb/Cr Y/Pb/Pr	Video only(side)

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No.	Item	Specification	Remarks
6	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
7	HDMI Input (3EA)	HDMI1-DTV/DVI HDMI2-DTV HDMI3-DTV	PC(HDMI version 1.3) Support HDCP The number of Input ports is different by model.
8	Audio Input (1EA)	RGB/DVI Audio	In case of the RGB/DVI Audio input,
9	SDPIF out (1EA)	SPDIF out	
10	USB (1EA)	EMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD
12	DVB	DVB-T	CI : UK, Finland, Denmark, Norway, Sweden, Russia, Spain, Ireland, Luxemburg, Belgium, Netherland CI+ : France(Canal+), Italy(DGTVi)
		DVB-C	CI : Switzerland, Austria, Slovenia, Hungary, Bulgaria CI+ : Switzerland(UPC,Cablecom), Netherland(Ziggo), Germany(KDG,CWB), Finland(labwise)
13	RS232C (1EA)	Interactive mode support	

5. Video resolutions (2D)

5.1. Component Input (Y, C_B/P_B, C_R/P_R)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I
2	720*480	15.73	59.94	13.50	SDTV ,DVD 480I
3	720*480	31.50	60.00	27.027	SDTV 480P
4	720*480	31.47	59.94	27.00	SDTV 480P
5	1280*720	45.00	60.00	74.25	HDTV 720P
6	1280*720	44.96	59.94	74.176	HDTV 720P
7	1920*1080	33.75	60.00	74.25	HDTV 1080I
8	1920*1080	33.72	59.94	74.176	HDTV 1080I
9	1920*1080	67.50	60.00	148.50	HDTV 1080P
10	1920*1080	67.432	59.94	148.352	HDTV 1080P
11	1920*1080	27.00	24.00	74.25	HDTV 1080P
12	1920*1080	26.97	23.94	74.176	HDTV 1080P
13	1920*1080	33.75	30.00	74.25	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	HDTV 1080P

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5.2. RGB Input (PC)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	DDC
1	640*350	31.468	70.09	25.17	EGA	X
2	720*400	31.469	70.08	28.32	DOS	O
3	640*480	31.469	59.94	25.17	VESA(VGA)	O
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6	1280*768	47.776	59.870	79.50	CVT(WXGA)	X
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	X
8	1280*1024	63.981	60.020	108.0	VESA (SXGA)	O
9	1600*1200	75.00	60.00	162.0	VESA (UXGA)	X
10	1920*1080	66.587	59.934	138.5	HDTV 1080P	O

5.3. HDMI Input(PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed		Remark
PC(DVI)					DDC		
1	640*350	31.468	70.09	25.17	EGA	X	
2	720*400	31.469	70.08	28.32	DOS	O	
3	640*480	31.469	59.94	25.17	VESA(VGA)	O	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O	
6	1280*768	47.776	59.870	79.50	CVT(WXGA)	X	
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O	
8	1280*1024	63.981	60.020	108.0	VESA (SXGA)	O	
9	1600*1200	75.00	60.00	162.0	VESA (UXGA)	X	
10	1920*1080	67.50	60.00	148.5	HDTV 1080P	O	
DTV							
1	720*480	31.50	60.00	27.027	SDTV 480P		
2	720*480	31.47	59.94	27.00	SDTV 480P		
3	1280*720	45.00	60.00	74.25	HDTV 720P		
4	1280*720	44.96	59.94	74.176	HDTV 720P		
5	1920*1080	33.75	60.00	74.25	HDTV 1080I		
6	1920*1080	33.72	59.94	74.176	HDTV 1080I		
7	1920*1080	67.50	60.00	148.50	HDTV 1080P		
8	1920*1080	67.432	59.94	148.352	HDTV 1080P		
9	1920*1080	27.00	24.00	74.25	HDTV 1080P		
10	1920*1080	26.97	23.976	74.176	HDTV 1080P		
11	1920*1080	33.75	30.00	74.25	HDTV 1080P		

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ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LCD TV with LD2AC chassis.

2. Designation

(1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
(2) Power adjustment : Free Voltage.
(3) Magnetic Field Condition: Nil.
(4) Input signal Unit: Product Specification Standard.
(5) Reserve after operation : Above 5 Minutes (Heat Run)
Temperature : at 25 °C ± 5 °C
Relative humidity : 65 ± 10 %
Input voltage : 220 V, 60 Hz
(6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig, Service remote control.
(7) Push the "IN STOP" key - For memory initialization.

Case1 : Software version up
1. After downloading S/W by USB , TV set will reboot automatically.
2. Push “In-stop” key.
3. Push “Power on” key.
4. Function inspection
5. After function inspection, Push “In-stop” key.

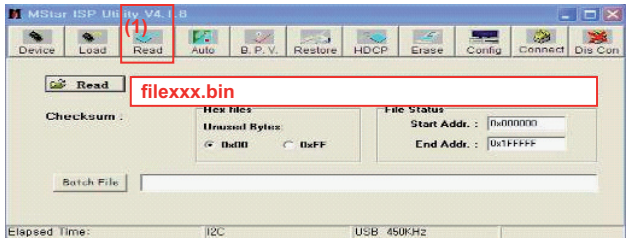
Case2 : Function check at the assembly line
1. When TV set is entering on the assembly line, Push “In-stop” key at first.
2. Push “Power on” key for turning it on.
→ If you push “Power on” key, TV set will recover channel information by itself.
3. After function inspection, Push “In-stop” key.

3. Main PCB check process

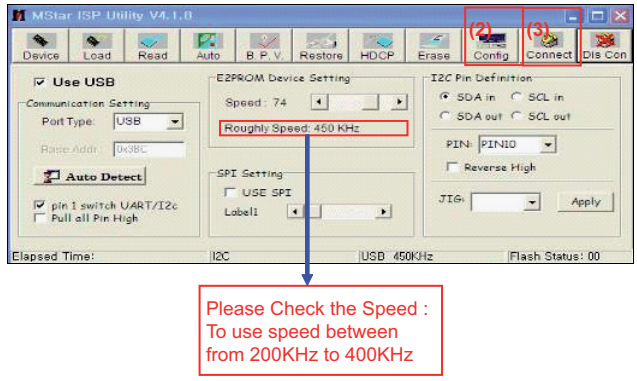
▪ APC - After Manual-Insert, executing APC

* Boot file Download

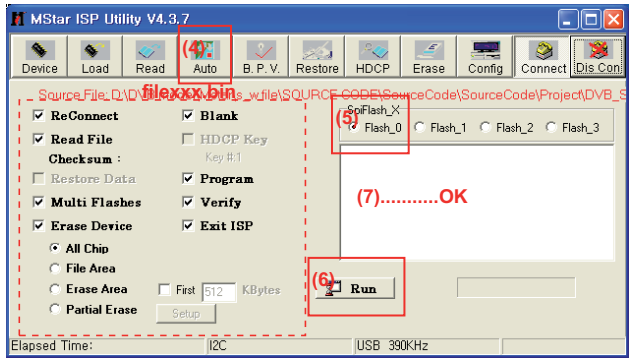
(1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
(2) Set as below, and then click "Auto Detect" and check "OK" message.
If "Error" is displayed, check connection between computer, jig, and set.
(3) Click "Read" tab, and then load download file(XXXX.bin) by clicking "Read"



(4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig, and set.

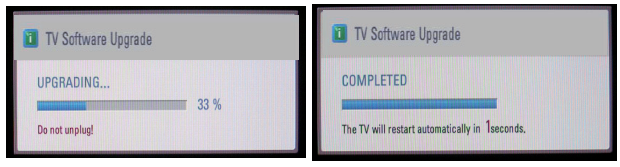


(5) Click "Auto" tab and set as below.
(6) Click "Run".
(7) After downloading, check "OK" message.



* USB DOWNLOAD

(1) Put the USB Stick to the USB socket.
(2) Automatically detecting update file in USB Stick.
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.
(3) Show the message "Copying files from memory".
(4) Updating is starting.



(5) Updating Completed, The TV will restart automatically.
(6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn’t have a DTV/ATV test on production line.

* After downloading, have to adjust Tool Option again.
(1) Push "IN-START" key in service remote control.
(2) Select "Tool Option 1" and push "OK" key.
(3) Punch in the number. (Each model has their number)

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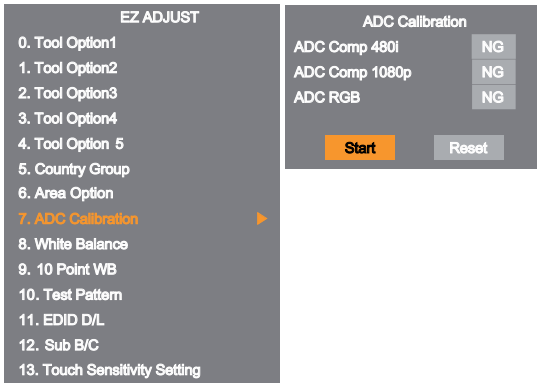
3.1. ADC Process

(1) ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "►" key at "7. ADC Calibration".



<Caution> Using "P-ONLY" key of the Adjustment remote control, power on TV.
If there is no Component Input, disappear “ADC Comp” message.

* ADC Calibration Protocol (RS232)

NO	Item	CMD 1	CMD 2	Data 0		
Enter Adjust MODE	Adjust ‘Mode In’	A	A	0	0	When transfer the ‘Mode In’, Carry the command.
ADC adjust	ADC Adjust	A	D	1	0	Automatically adjustment (The use of a internal pattern)

Adjust Sequence

- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [RGB Input (1024*768)] (only LD21B)
- ad 00 10 [Adjust 1024*768 RGB] (only LD21B)
- aa 00 90 End Adjust mode

* Required equipment : Adjustment remote control.

3.2. Function Check

3.2.1. Check display and sound

■ Check Input and Signal items. (cf. work instructions)

1. TV
2. AV
3. COMPONENT (480i)
4. RGB (PC : 1024 x 768 @ 60hz)
5. HDMI
6. PC Audio In

* Display and Sound check is executed by Remote controller

Caution : Not to push the INSTOP KEY after completion if the function inspection.

4. Total Assembly line process

4.1. Adjustment Preparation

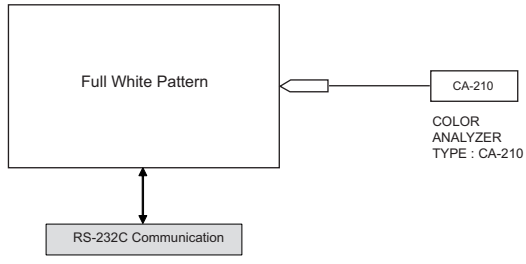
- W/B Equipment condition
  CA210
  : CCFL/EEFL -> CH9, Test signal: Inner pattern(80IRE)
  LED -> CH14, Test signal: Inner pattern(80IRE)
- Above 5 minutes H/run in the inner pattern. (“power on” key of adjust remote control)

Mode	Temp	Coordinate spec	Target	
Cool	13,000k	X=0.269 (±0.002) Y=0.273 (±0.002)	X=0.271 Y=0.276	<Test Signal> Inner pattern (204gray, 80IRE)
Medium	9,300k	X=0.285 (±0.002) Y=0.293 (±0.002)	X=0.287 Y=0.296	
Warm	6,500k	X=0.313 (±0.002) Y=0.329 (±0.002)	X=0.315 Y=0.332	

- Edge LED W/B Table in process of aging time (Only LGD Edge LED Module except AUO, CMI, IPS Module)
  CA210 : CH 14, Test signal : Inner pattern (80IRE)

GP4	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	280	287	296	307	320	337
2	3-5	279	285	295	305	319	335
3	6-9	277	284	293	304	317	334
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

* Connecting picture of the measuring instrument
(On Automatic control)
Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON → Enter the mode of White-Balance, the pattern will come out.



* Auto-control interface and directions

(1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10 lux).
(2) Adhere closely the Color analyzer(CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color analyzer's prove vertically.(80° ~ 100°).
(3) Aging time
- After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
- Using 'no signal' or 'POWER ONLY' or the others, check the back light on.

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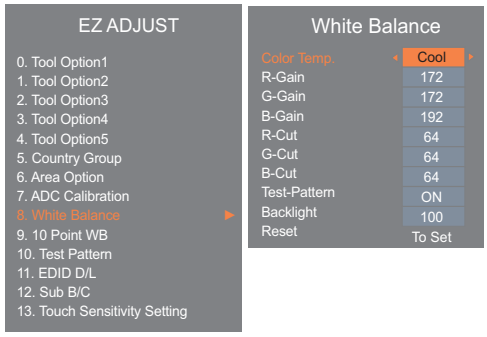
▪ Auto adjustment Map(using RS-232C to USB cable)
RS-232C COMMAND
[CMD ID DATA]
Wb 00 00 White Balance Start
Wb 00 ff White Balance End

	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

<Caution>
Color Temperature : COOL, Medium, Warm.
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.(When R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

*** Manual W/B process using adjust Remote control.**
▪ After enter Service Mode by pushing "ADJ" key,
▪ Enter White Balance by pushing "▶" key at "8. White Balance".



* After you finished all adjustments, Press "In-start" key and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model's module from factory Jig model.
* Push the "IN STOP" key after completing the function inspection. And Mechanical Power Switch must be set “ON”.

4.2. DDC EDID Write (RGB 128Byte)

■ Connect D-sub Signal Cable to D-Sub Jack.
■ Write EDID DATA to EEPROM (24C02) by using DDC2B protocol.
■ Check whether written EDID data is correct or not.
* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

4.3 DDC EDID Write (HDMI 256Byte)

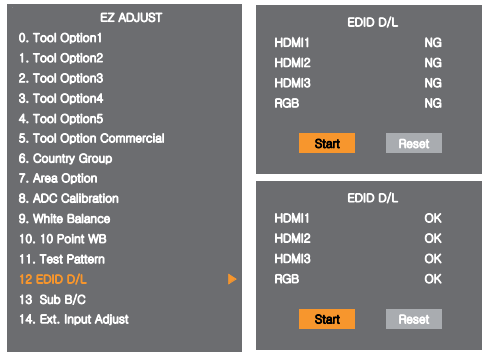
■ Connect HDMI Signal Cable to HDMI Jack.
■ Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
■ Check whether written EDID data is correct or not.
* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

4.4. EDID data

(1) All Data : HEXA Value
(2) Changeable Data :
*: Serial No : Controlled / Data:01
**: Month : Controlled / Data:00
***:Year : Controlled
****:Check sum

4.4.1. Auto Download

■ After enter Service Mode by pushing “ADJ” key,
■Enter EDID D/L mode.
■Enter “START” by pushing “OK” key.
* Caution : Never connect HDMI & D-sub Cable when EDID downloaded.



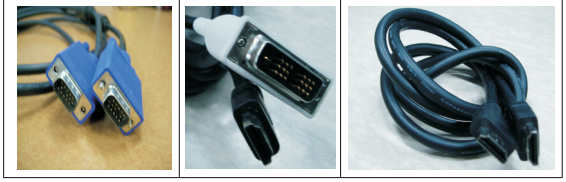
* EDID data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0		
Enter download MODE	Download ‘Mode In’	A	A	0	0	When transfer the ‘Mode In’, Carry the command.
EDID data and Model option download	Download	A	E	00	10	Automatically download (The use of a internal data)

4.4.2. Manual Download

<Caution>
(1) Use the proper signal cable for EDID Download
- Analog EDID : Pin3 exists
- Digital EDID : Pin3 exists
(2) Never connect HDMI & D-sub Cable at the same time.
(3) Use the proper cables below for EDID Writing.
(4) Download HDMI1, HDMI2 separately because HDMI1 is different from HDMI2.

For Analog	For HDMI EDID
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI



No.	Item	Condition	Hex Data
1	Manufacturer ID	GSM	1E6D
2	Version	Digital : 1	01
3	Revision	Digital : 3	03

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(1) HD RGB EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c		01	03	68	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	71	40	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
40	35	00	40	84	00	00	00	1C	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d														00	e
80	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
90	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
A0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
B0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
C0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
D0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
E0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
F0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

(2) HD HDMI EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c		01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d														01	e
80	02	03	22	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	f					
A0	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	A0	5A
B0	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
C0	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
D0	96	00	A0	5A	00	00	00	18	02	3A	80	18	71	38	2D	40
E0	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e

(3) Detail EDID Options are below

a. Product ID

MODEL NAME	HEX	EDID Table	DDC Function
HD/FHD Model	0001	01 00	Analog/Digital

b. Serial No: Controlled on production line.

c. Month, Year: Controlled on production line:

ex) Week : '01' -> '01'

Year : '2012' -> '16' fix

d. Model Name(Hex):

cf) TV set's model name in EDID data is below.

Model name	MODEL NAME(HEX)
LG TV	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 (LG TV)

e. Checksum: Changeable by total EDID data.

EDID C/S data		HD	
		HDMI	RGB
Check sum (Hex)	Block 0	A4	A5
	Block 1	5B (HDMI1)	-
		4B (HDMI2)	
		3B (HDMI3)	

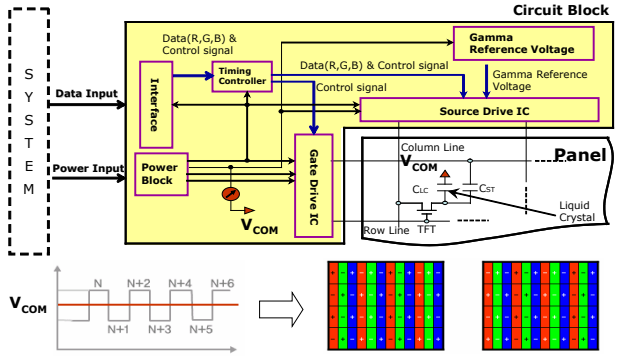
f. Vendor Specific(HDMI)

Input	Model name(HEX)
HDMI1	67030C001000
HDMI2	67030C002000
HDMI3	67030C003000

4.5. V-COM Adjust(Only LGD(M+S) Module)

- Why need Vcom adjustment?

■ The Vcom(Common Voltage) is a Reference Voltage of Liquid Crystal Driving. → Liquid Crystal need for Polarity Change with every frame.



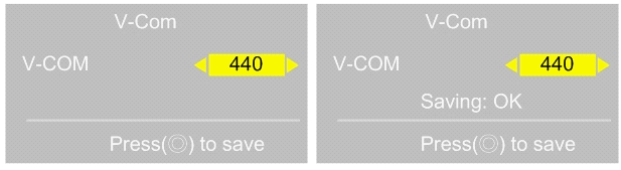
- Adjust sequence

■ Press the PIP key of the ADJ remote controller. (This PIP key is hot key to enter the VCOM adjusting mode)
(Or After enter Service Mode by pushing "ADJ" key, then Enter V-Com Adjust mode by pushing "►" key at "12. V-Com")

■ As pushing the right or the left button on the remote controller, And find the V-COM value Which is no or minimized the Flicker. (If there is no flicker at default value, Press the exit key and finish the VCOM adjustment.)

■ Push the OK key to store value. Then the message "Saving OK" is pop.

■ Press the exit key to finish VCOM adjustment.



4.6. Outgoing condition Configuration

■ When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then automatically turn off.
(Must not AC power OFF during blinking)

4.7. Hi-pot Test

Confirm whether is normal or not when between power board's ac block and GND is impacted on 1.5 kV(dc) or 2.2 kV(dc) for one second

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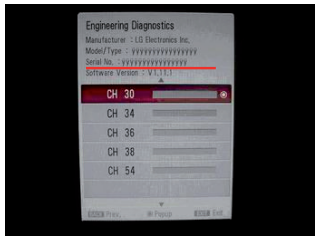
5. Model name & Serial number D/L

- Press "Power on" key of service remote control. (Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at the Diagnostics of SET UP menu. (Refer to below).



5.1. Signal Table

CMD	LENGTH	ADH	ADL	DATA_1	. . .	Data_n	CS	DELAY

CMD : A0h
LENGTH : 85~94h (1~16 bytes)
ADH : EEPROM Sub Address high (00~1F)
ADL : EEPROM Sub Address low (00~FF)
Data : Write data
CS : CMD + LENGTH + ADH + ADL + Data_1 +...+ Data_n
Delay : 20ms

5.2. Comand Set

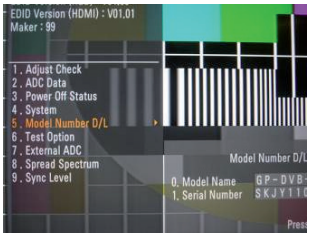
Adjust mode	CMD(hex)	LENGTH(hex)	Description
EEPROM WRITE	A0h	84h+n	n-bytes Write (n = 1~16)

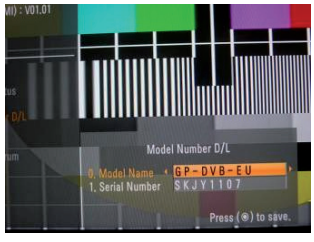
* Description
FOS Default write : <7mode data> write
Vtotal, V_Frequency, Sync_Polarity, Htotal, Hstart, Vstart, 0, Phase
Data write : Model Name and Serial Number write in EEPROM,.

5.3. Method & notice

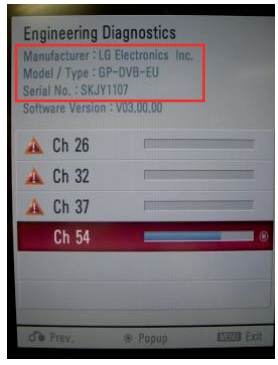
(1) Serial number D/L is using of scan equipment.
(2) Setting of scan equipment operated by Manufacturing Technology Group.
(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download(Model Name and Serial Number)
If the TV set is downloaded by OTA or Service man, sometimes model name or serial number is initialized.(Not always)
There is impossible to download by bar code scan, so It need Manual download.
1) Press the "Instart" key of Adjustment remote control.
2) Go to the menu "5.Model Number D/L" like below photo.
3) Input the Factory model name or Serial number like photo.





4) Check the model name Instart menu. → Factory name displayed. (ex 42LD450-ZA)
5) Check the Diagnostics.(DTV country only) → Buyer model displayed.(ex 42LD450)



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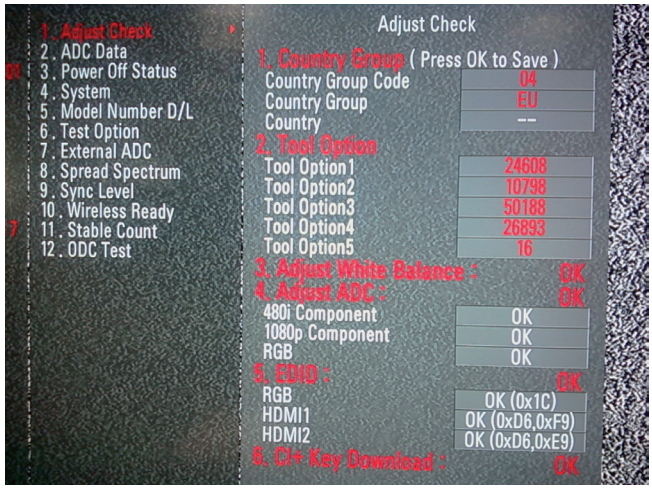
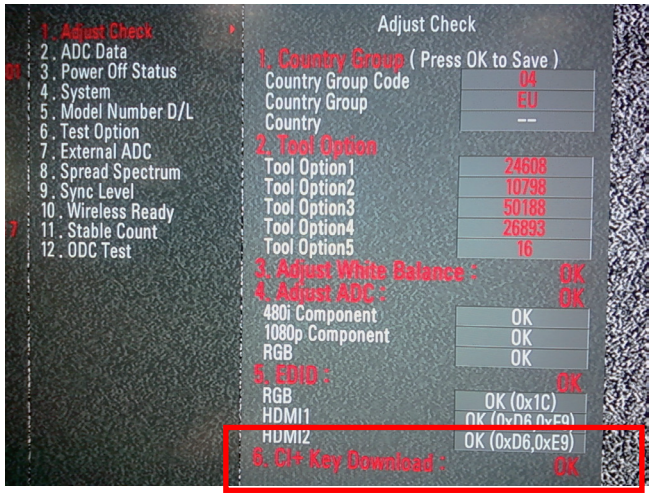
6. CI+ Key Download method

6.1. Download Procedure

(1) Press "Power on" key of a service R/C.
(Baud rate : 115200 bps)
(2) Connect RS232-C Signal Cable.
(3) Write CI+ Key through RS-232-C.
(4) Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.
1. Check the method of CI+ Key value
a. Check the method on Instart menu



b. Check the method of RS232C Command
1) Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

2) Check the key download for transmitted command
(RS232 : ci 00 10)

CMD 1	CMD 2	Data 0	
C	I	1	0

3) Result value
- Normally status for download : OKx
- Abnormally status for download : NGx

2. Check the method of CI+ key value (RS232)
1) Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0	
A	A	0	0

2) Check the mothed of CI+ key by command
(RS232 : ci 00 20)

CMD 1	CMD 2	Data 0	
C	I	2	0

3) result value
i 01 OK 1d1852d21c1ed5dcx
CI+ Key Value

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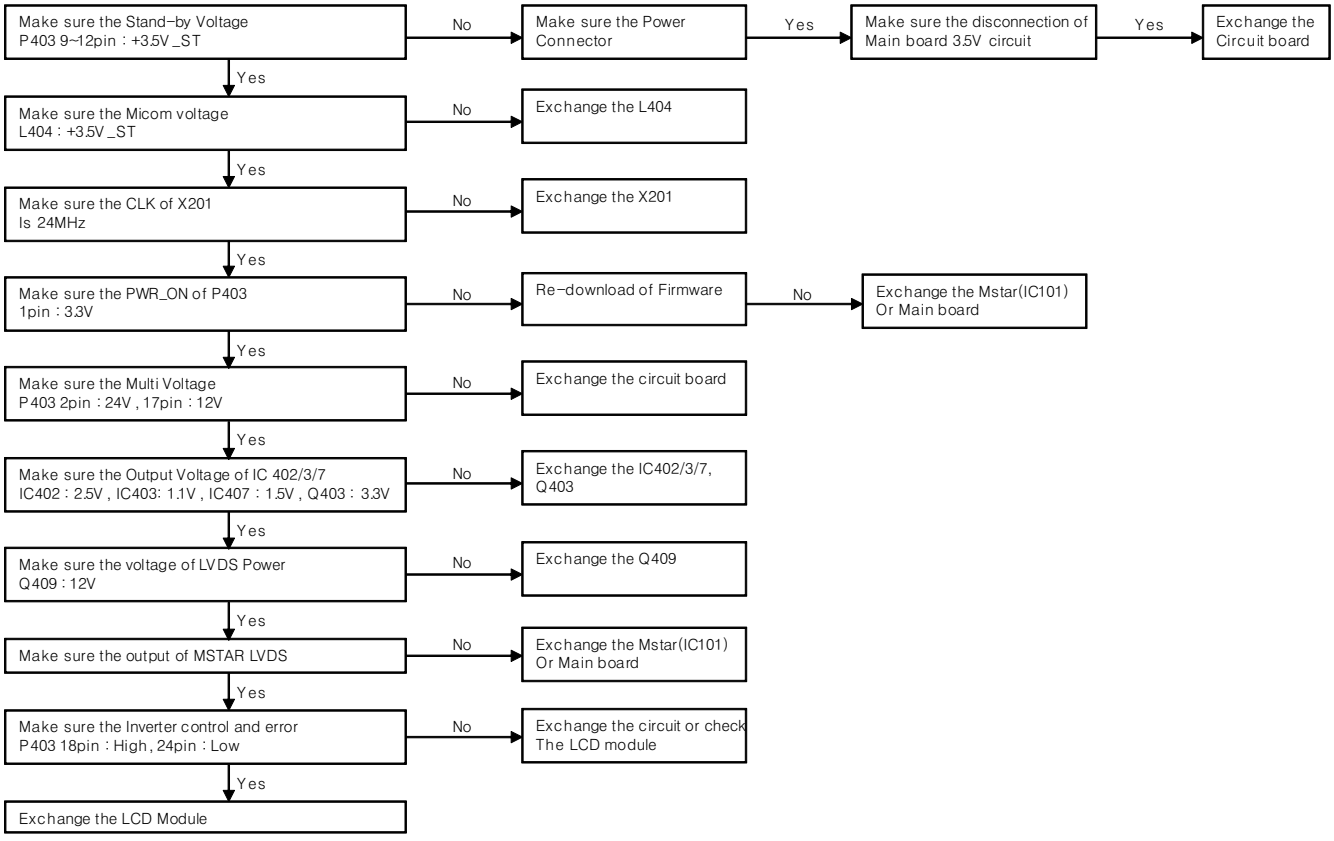
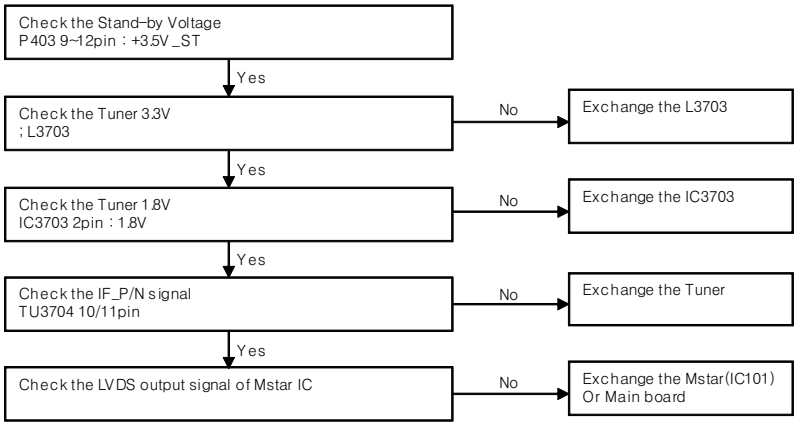
TROUBLE SHOOTING

1. Check the booting Voltage



2. Digital TV Video



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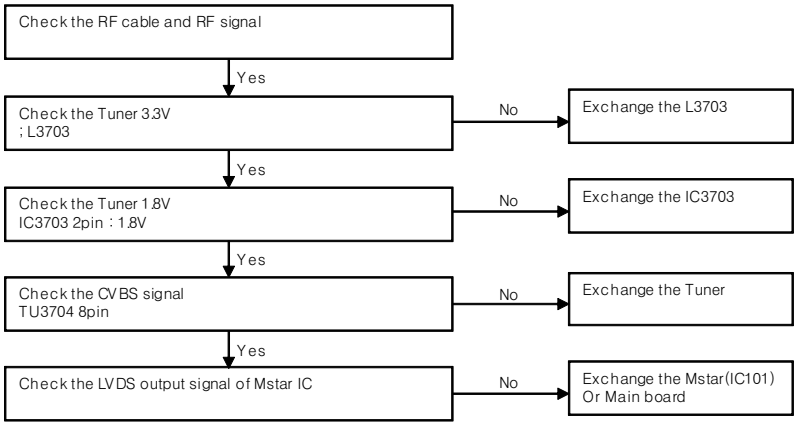
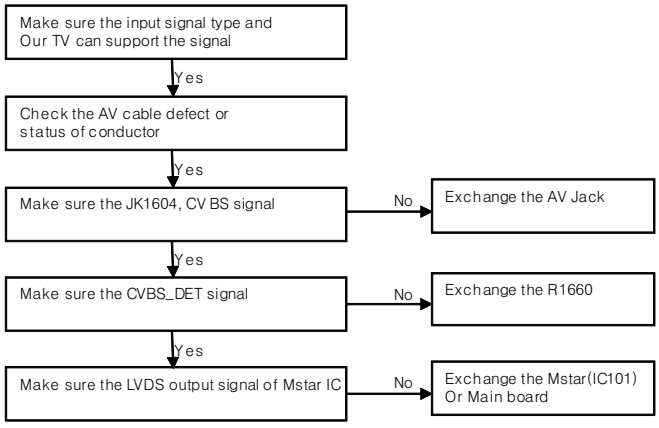
3. Analog TV Video



4. AV Video



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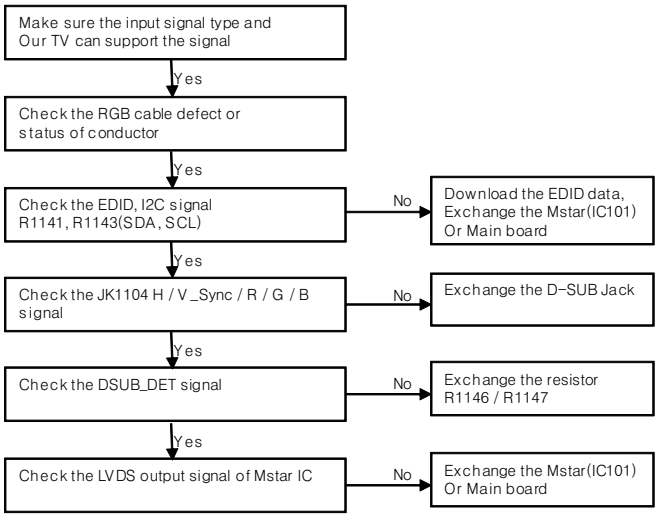
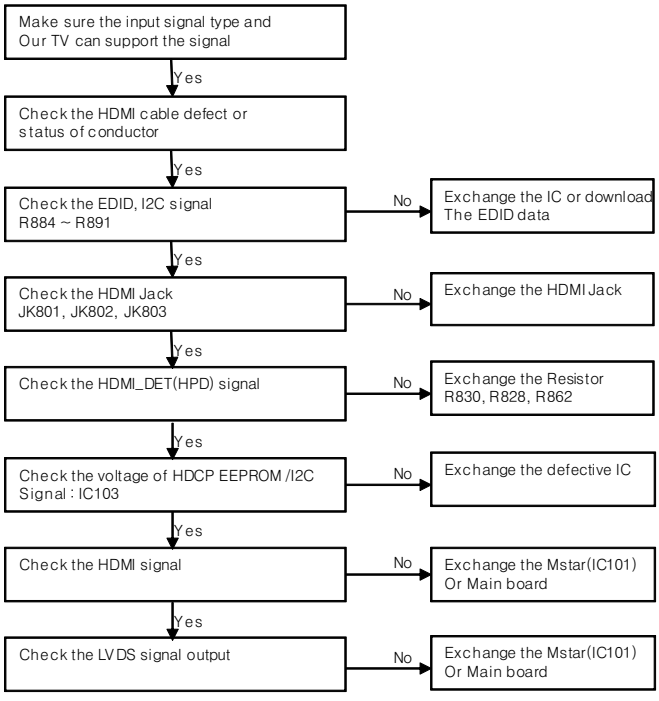
5. RGB Video


Make sure the input signal type and Our TV can support the signal
Yes
Check the RGB cable defect or status of conductor
Yes
Check the EDID, I2C signal R1141, R1143(SDA, SCL)
No
Download the EDID data, Exchange the Mstar(IC101) Or Main board
Yes
Check the JK1104 H / V _Sync / R / G / B signal
No
Exchange the D-SUB Jack
Yes
Check the DSUB_DET signal
No
Exchange the resistor R1146 / R1147
Yes
Check the LVDS output signal of Mstar IC
No
Exchange the Mstar(IC101) Or Main board

6. HDMI Video


Make sure the input signal type and Our TV can support the signal
Yes
Check the HDMI cable defect or status of conductor
Yes
Check the EDID, I2C signal R884 ~ R891
No
Exchange the IC or download The EDID data
Yes
Check the HDMI Jack JK801, JK802, JK803
No
Exchange the HDMI Jack
Yes
Check the HDMI_DET(HPD) signal
No
Exchange the Resistor R830, R828, R862
Yes
Check the voltage of HDCP EEPROM /I2C Signal : IC103
No
Exchange the defective IC
Yes
Check the HDMI signal
No
Exchange the Mstar(IC101) Or Main board
Yes
Check the LVDS signal output
No
Exchange the Mstar(IC101) Or Main board

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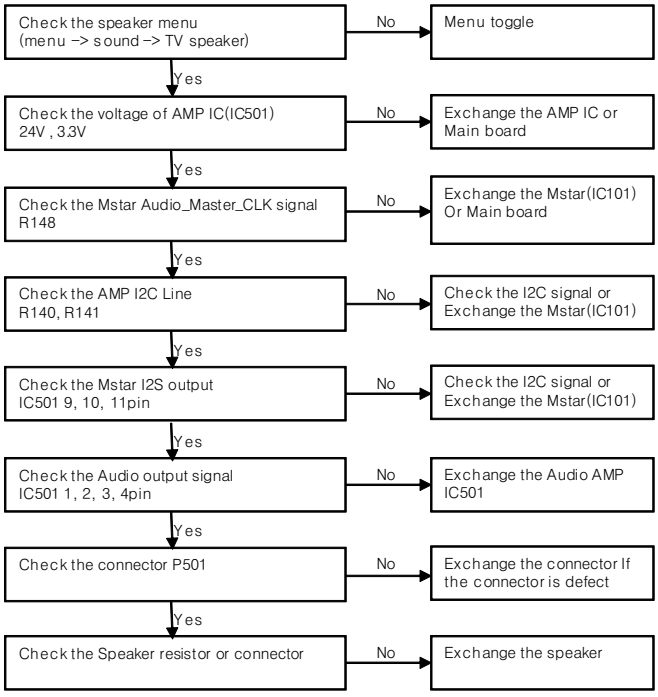
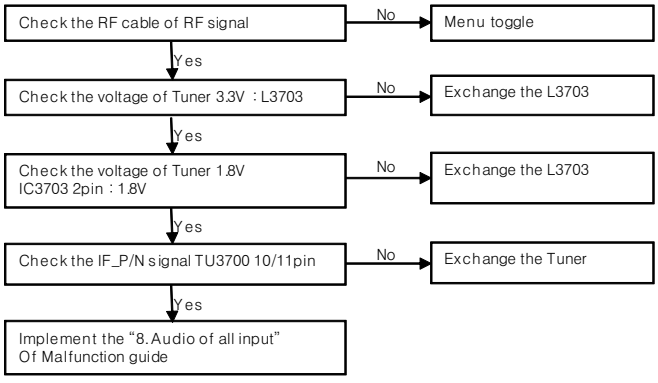
7. Audio of All iput



8. TV Audio



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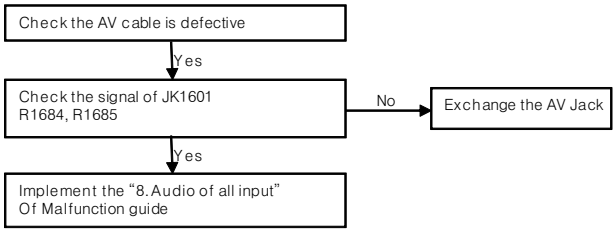
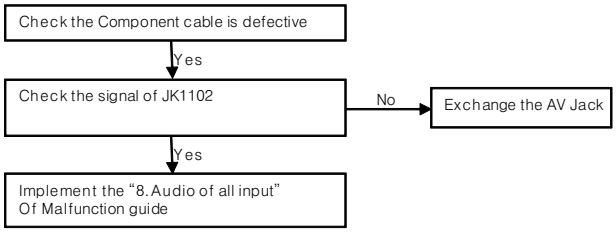
9. AV Audio



10. RGB Audio



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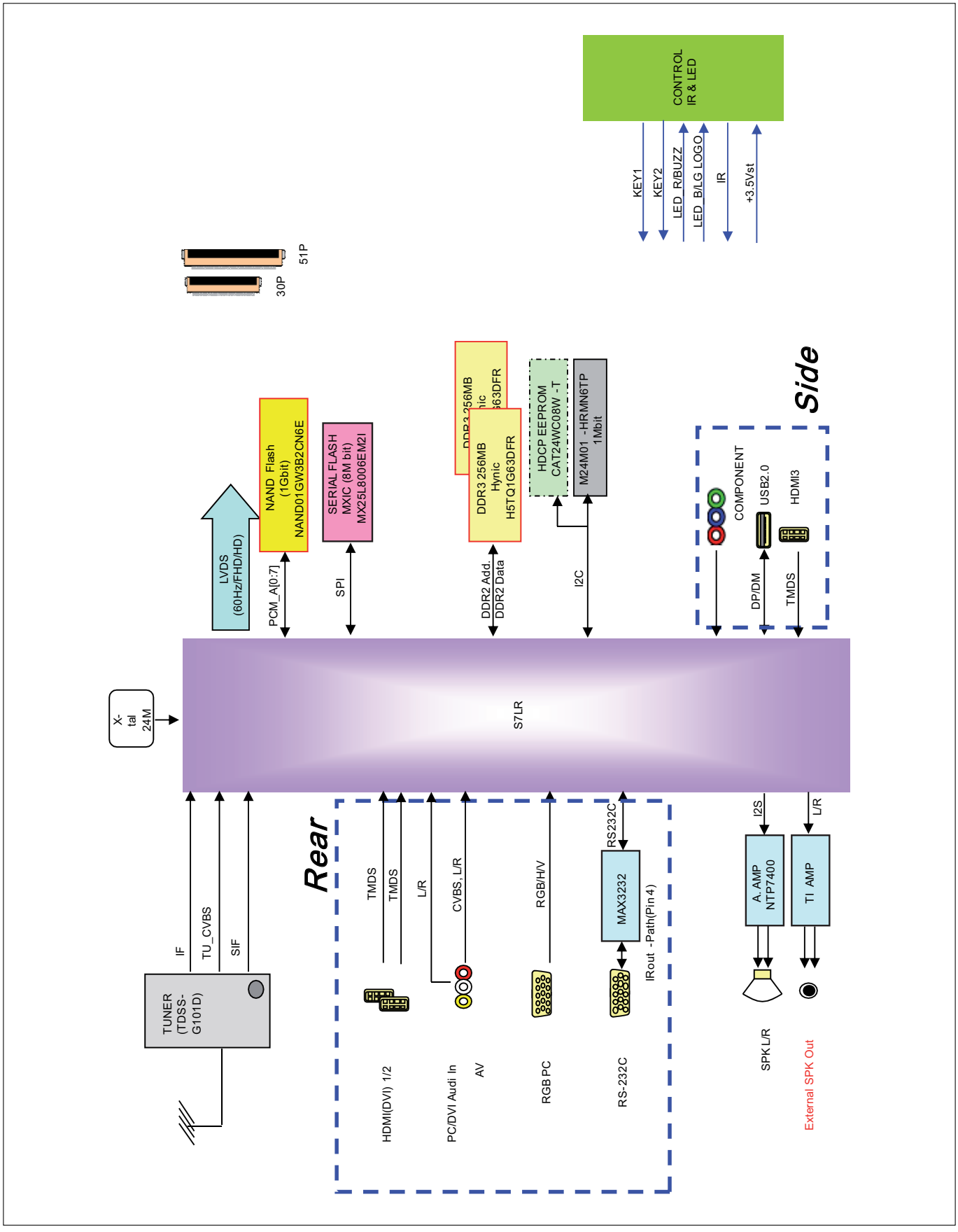
BLOCK DIAGRAM



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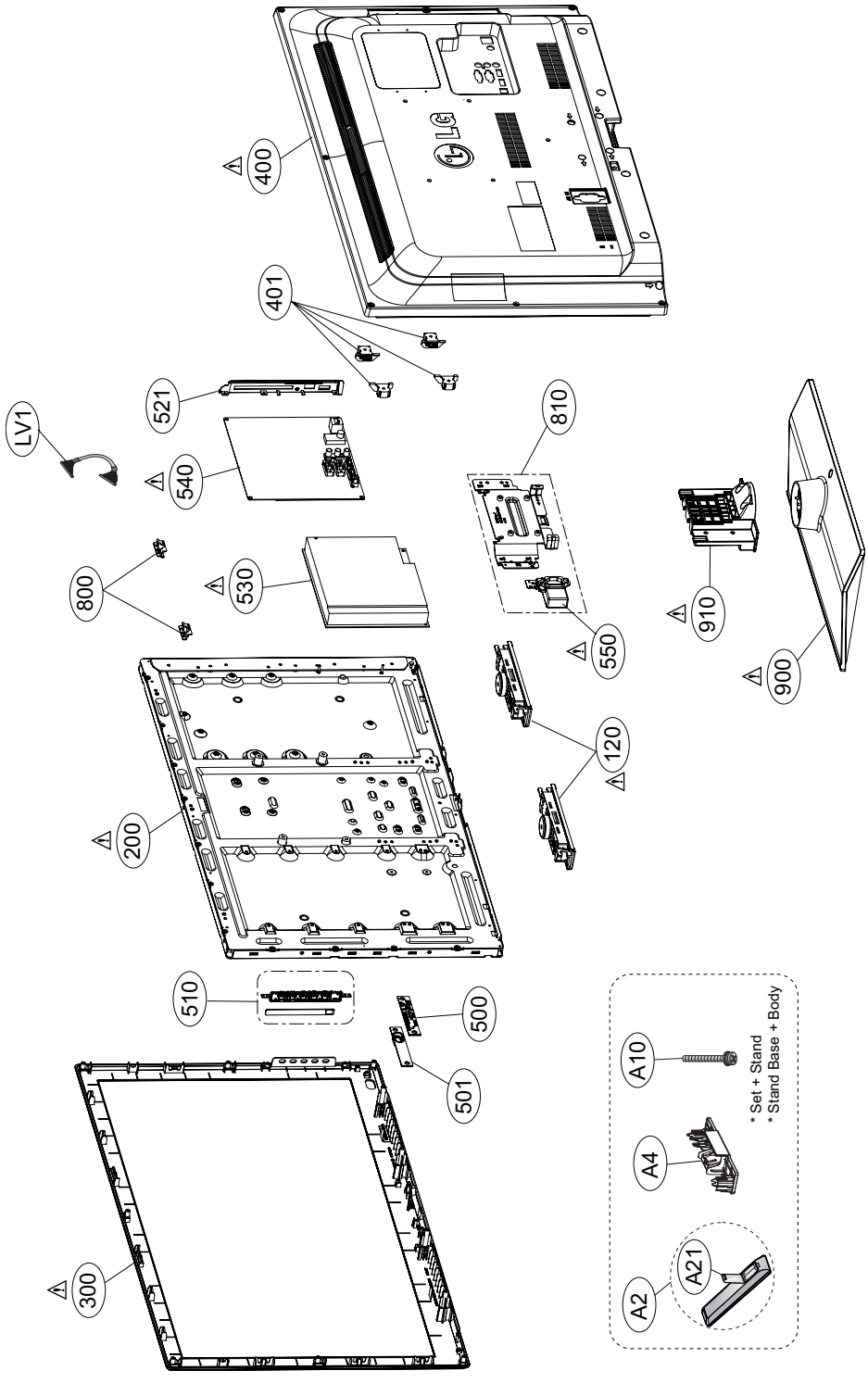
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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NAND FLASH MEMORY

IC102
NAND01GW3B2CN6E
NAND_FLASH_1G_NUMONYX
EAN60762401

+3.3V_Normal

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 RB RE CE NC_7 NC_8 VDD_1 VSS_1 NC_9 NC_10 CL AL WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VDD_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

/F_RB /PF_OE /PF_CE0 /PF_CE1 PF_ALE /PF_WE /PF_WP

R107 1K
R109 7.5K
R108 1K OPT
C101 0.1uF
R105 1K OPT
R104 OPT
R106 1K
Q101 KRC103S OPT
R102 3.3K

+3.3V_Normal

22
AR101
PCM_A[7] PCM_A[6] PCM_A[5] PCM_A[4]

C102 10uF
C103 0.1uF

AR102
PCM_A[3] PCM_A[2] PCM_A[1] PCM_A[0]
22

PCM_A[0-7]

<CHIP Config(LED_R/BUZZ)>

Boot from SPI CS1N(EXT_FLASH) 1'b0
Boot from SPI_CS0N(INT_FLASH) 1'b1

<CHIP Config>

(I2S_OUT_BCK,I2S_OUT_MCK,PAD_PWM1PAD_PWM0)

B51_no_EJ	: 4'b0000 Boot from 8051 with SPI flash
SB51_WOS	: 4'b0001 Secure B51 without scramble
SB51_WS	: 4'b0010 Secure B51 with scramble
MIPS_SPE_NO_EJ	: 4'b0100 Boot from MIPS with SPI flash
MIPS_SPI_EJ_1	: 4'b0101 Boot from MIPS with SPI flash
MIPS_SPI_EJ_2	: 4'b0110 Boot from MIPS with SPI flash
MIPS_WOS	: 4'b1001 Secure MIPS without scramble
MIPS_WS	: 4'b1010 Scerur MIPS with SCRAMBLE

+3.3V_Normal

R145 OPT
R117 OPT
R115 OPT
R123 OPT
R152 OPT
R116 1K OPT
R118 1K OPT
R121 1K OPT
R124 1K OPT
R153 1K OPT

LED_R
AUD_SCK
AUD_MASTER_CLK_0
PWM1
PWM0

AUD_MASTER_CLK
R148 56
C112 100pF 50V

DIMMING

A_DIM
PWM_DIM
R156 10K
R157 100
C111 2.2uF
PWM0
PWM2

I2C

+3.3V_Normal

R140 4.7K
R141 4.7K
R144 2.2K
R145 2.2K

AMP_SDA
AMP_SCL
I2C_SDA
I2C_SCL

IC101 LGE2112-T8

S7LR_DIVX_MS10

PCM_D[0-7]
PCM_D[0] W21
PCM_D[1] AA18
PCM_D[2] AB22
PCM_D[3] AE20
PCM_D[4] AA15
PCM_D[5] AE21
PCM_D[6] AB21
PCM_D[7] Y15

PCM_A[0-14]
PCM_A[0] W20
PCM_A[1] V20
PCM_A[2] W22
PCM_A[3] AB18
PCM_A[4] AA20
PCM_A[5] AA21
PCM_A[6] Y19
PCM_A[7] AB17
PCM_A[8] Y16
PCM_A[9] AB19
PCM_A[10] AB20
PCM_A[11] AA16
PCM_A[12] AA19
PCM_A[13] AC21
PCM_A[14] AA17

/PCM_REG Y20
/PCM_OE AB15
/PCM_WE AA22
/PCM_IORD AD22
/PCM_IOWR AD20
/PCM_CE AD21
/PCM_IRQA AC20
/PCM_CD Y18
/PCM_WAIT Y21
PCM_RST Y22

+5V_Normal
R132 10K
R133 10K
C108 0.1uF OPT
C109 0.1uF

/CI_CD1 /CI_CD2
OPT
R120 22 OPT
R122 22 OPT
USB1_OCD U21
USB1_CTL V21
PCM_5V_CTL R20
ERROR_OUT T20
PCM2_RESET/GPIO134 U22

to delete CI or gate IC

for SYSTEM/HDCP EEPROM&URSA3
I2C_SCL P23
I2C_SDA P24
R136 22
R137 22
RGB_DDC_SDA D2
RGB_DDC_SCL D1
R138 22
R139 22

RJP_CTRL0 D4
RJP_CTRL1 E4
PM_TXD N25
PM_RXD N24
R130 22
R131 22
MODEL_OPT_6 B8
MODEL_OPT_7 A8

PWM0 P21
PWM1 N23
PWM2 P22
LED_W R21
RJP_CTRL2 P20
LED_R F6

+3.5V_ST
R149 4.7K
R143 4.7K OPT
EXT12V_CTRL

KEY1 H6
KEY2 G5
G4
R101 22 J5
R163 22 J4
R164 22
SCART1_MUTE

R23
R24
R25
T21
T22

VSYNC_LIKE/GPIO145
SPI1_CK/GPIO201
SPI1_DI/GPIO202
SPI2_CK/GPIO203
SPI2_DI/GPIO204

PCMDATA[0]/GPIO126
PCMDATA[1]/GPIO127
PCMDATA[2]/GPIO128
PCMDATA[3]/GPIO120
PCMDATA[4]/GPIO119
PCMDATA[5]/GPIO118
PCMDATA[6]/GPIO117
PCMDATA[7]/GPIO116

PCMADR[0]/GPIO125
PCMADR[1]/GPIO124
PCMADR[2]/GPIO122
PCMADR[3]/GPIO121
PCMADR[4]/GPIO99
PCMADR[5]/GPIO101
PCMADR[6]/GPIO102
PCMADR[7]/GPIO103
PCMADR[8]/GPIO108
PCMADR[9]/GPIO110
PCMADR[10]/GPIO114
PCMADR[11]/GPIO112
PCMADR[12]/GPIO104
PCMADR[13]/GPIO107
PCMADR[14]/GPIO106

PCMREG_N/GPIO123
PCMOE_N/GPIO113
PCMWE_N/GPIO197
PCMIORD_N/GPIO111
PCMIOWR_N/GPIO109
PCMCE_N/GPIO115
PCMIRQA_N/GPIO105
PCMCD_N/GPIO130
PCMWAIT_N/GPIO100
PCM_RESET/GPIO129

PCM2_CE_N/GPIO131
PCM2_IRQA_N/GPIO132
PCM2_CD_N/GPIO135
PCM2_WAIT_N/GPIO133
PCM2_RESET/GPIO134

UART1_TX/GPIO43
UART1_RX/GPIO44
UART2_TX/GPIO65
UART2_RX/GPIO64
UART3_TX/GPIO47
UART3_RX/GPIO48

I2C_SCKM2/DDCR_CK/GPIO72
I2C_SDAM2/DDCR_DA/GPIO71

DDCA_DA/UART0_TX
DDCA_CK/UART0_RX

PWM0/GPIO66
PWM1/GPIO67
PWM2/GPIO68
PWM3/GPIO69
PWM4/GPIO70
PWM_PM/GPIO199

SAR0/GPIO31
SAR1/GPIO32
SAR2/GPIO33
SAR3/GPIO34
SAR4/GPIO35

NF_CE1Z/GPIO138
NF_WPZ/GPIO198
NF_CEZ/GPIO137
NF_CLE/GPIO136
NF_REZ/GPIO139
NF_WEZ/GPIO140
NF_ALE/GPIO141
NF_RBZ/GPIO142

AR103 22
AE18 AC17 AD18 AC18 AC19 AD17 AE17 AD19
/PF_WP /PF_CE0 /PF_CE1 /PF_OE /PF_WE PF_ALE /F_RB
AR104 22

GPIO_PM[0]/GPIO6
PM_UART_TX/GPIO_PM[1]/GPIO7
GPIO_PM[2]/GPIO8
GPIO_PM[3]/GPIO9
GPIO_PM[4]/GPIO10
PM_UART_RX/GPIO_PM[5]/GPIO11
PM_SPI_SCZ1/GPIO_PM[6]/GPIO12
GPIO_PM[7]/GPIO13
GPIO_PM[8]/GPIO14
GPIO_PM[9]/GPIO15
PM_SPI_SCZ2/GPIO_PM[10]/GPIO16
GPIO_PM[11]/GPIO17

PM_SPI_SCK/GPIO1
PM_SPI_CZ0/GPIO_PM[12]/GPIO0
PM_SPI_SDI/GPIO2
PM_SPI_SDO/GPIO3

H5 K6 K5 J6 K4 L6 C2 L5 M6 M5 C1 M4 A2 D3 B2 B1
R134 22
R135 22
R110 22
R114 22
R142 22
R147 33
R154 33
R146 33
R151 33
OPT
POWER_DET PM_TXD INV_CTL BL_ON POWER_ON/OFF_1 PM_RXD /FLASH_WP SUB_AMP_MUTE PANEL_CTL PM_MODEL_OPT_0 AMP_MUTE SPI_SCK /SPI_CS SPI_SD1 SPI_SDO

for SERIAL FLASH

TS0CLK/GPIO87
TS0VALID/GPIO85
TS0SYNC/GPIO86

TS0DATA_[0]/GPIO77
TS0DATA_[1]/GPIO78
TS0DATA_[2]/GPIO79
TS0DATA_[3]/GPIO80
TS0DATA_[4]/GPIO81
TS0DATA_[5]/GPIO82
TS0DATA_[6]/GPIO83
TS0DATA_[7]/GPIO84

Y14 AA10 Y12
CI_TS_CLK CI_TS_VAL CI_TS_SYNC CI_TS_DATA[0-7]
from CI SLOT

Y13 Y11 AA12 AB12 AA14 AB14 AA13 AB11
CI_TS_DATA[0] CI_TS_DATA[1] CI_TS_DATA[2] CI_TS_DATA[3] CI_TS_DATA[4] CI_TS_DATA[5] CI_TS_DATA[6] CI_TS_DATA[7]

TS1CLK/GPIO98
TS1VALID/GPIO96
TS1SYNC/GPIO97

TS1DATA_[0]/GPIO88
TS1DATA_[1]/GPIO89
TS1DATA_[2]/GPIO90
TS1DATA_[3]/GPIO91
TS1DATA_[4]/GPIO92
TS1DATA_[5]/GPIO93
TS1DATA_[6]/GPIO94
TS1DATA_[7]/GPIO95

AC15 AD15 AC16
FE_TS_CLK FE_TS_VAL_ERR FE_TS_SYNC FE_TS_DATA[0-7]
Internal demod out

AD16 AE15 AE14 AC13 AC14 AD12 AD13 AD14
FE_TS_DATA[0] FE_TS_DATA[1] FE_TS_DATA[2] FE_TS_DATA[3] FE_TS_DATA[4] FE_TS_DATA[5] FE_TS_DATA[6] FE_TS_DATA[7]

UO4_LGE2111A-W1
IC101-*4
LGE2111A-W1 [MULTI]

C7 E6 F5 B6 E5 D5 B7 E7 AB5 F4 AB1 N6 AB2 AC2
GPIO36 GPIO37 GPIO38 GPIO39 GPIO40 GPIO41 GPIO42 GPIO45 GPIO46 GPIO49 GPIO50 GPIO51 GPIO52 I2C_SCKM0/GPIO53 I2C_SDAM0/GPIO54 GPIO73 GPIO74
LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N LVACKP LVACKN LVBCKP LVBCKN GPIO196 GPIO193 GPIO194 GPIO195
AB25 AB23 AC25 AB24 AD25 AC24 AE23 AC23 AC22 AD23 V23 U24 V25 V24 W25 W23 AA23 Y24 AA25 AA24 AE24 AD24 Y23 W24 T25 U23 T24 T23

IC104-*1
M24256-BRMN6TP
NVRAM_ST
E0 E1 E2 VSS VCC WC SCL SDA
EAN61548301

IC103-*1
CAT24C08WI-GT3-H-RECV(TV)
NC_1 NC_2 A2 VSS VCC WP SCL SDA
HDCP_EEPROM_ON_SEMI_NEW

HDCP EEPROM

+3.3V_Normal
Addr:10101--
HDCP_EEPROM_CATALYST_OLD
IC103
CAT24WC08W-T
R113 4.7K
HDCP_EEPROM
A0 A1 A2 VSS VCC WP SCL SDA
$0.199
HDCP_EEPROM R127 4.7K
C107 0.1uF HDCP_EEPROM
R128 22 HDCP_EEPROM
R129 22 HDCP_EEPROM
I2C_SCL
I2C_SDA

EEPROM

+3.3V_Normal
IC104
AT24C256C-SSHL-T
NVRAM,ATMEL
A0 A1 A2 GND VCC WP SCL SDA
A0'h
C105 0.1uF
C104 8pF OPT
C106 8pF OPT
R111 22 I2C_SCL
R112 22 I2C_SDA

PM MODEL OPTION

R175 10K TACT_KEY
R176 10K PWM_LED
PM_MODEL_OPT_0
PM_MODEL_OPT_1

S7LR_DIVX_MS10 IC101 LGE2112-T8

AMP_RESET
5V_DET_HDMI_1
5V_DET_HDMI_2
5V_DET_HDMI_4
AV_CVBS_DET
DSUB_DET
SC1_DET
EXT_SPK_DET
RJP_CTRL3
TUNER_RESET
MODEL_OPT_0
EXT_PWR_DET
MODEL_OPT_1
MODEL_OPT_2
RJP_CTRL4
R171 22

C7 E6 F5 B6 E5 D5 B7 E7 AB5 A9 F4 AB1 N6 AB2 AC2
GPIO36 GPIO37 GPIO38 GPIO39 GPIO40 GPIO41 GPIO42 GPIO45 GPIO46 GPIO49 GPIO50 GPIO51 GPIO52 I2C_SCKM0/GPIO53 I2C_SDAM0/GPIO54 GPIO73 GPIO74
LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N LVACKP LVACKN LVBCKP LVBCKN GPIO196 GPIO193 GPIO194 GPIO195
AB25 AB23 AC25 AB24 AD25 AC24 AE23 AC23 AC22 AD23 V23 U24 V25 V24 W25 W23 AA23 Y24 AA25 AA24 AE24 AD24 Y23 W24 T25 U23 T24 T23

RXA0+ RXA0- RXA1+ RXA1- RXA2+ RXA2- RXA3+ RXA3- RXA4+ RXA4-
RXB0+ RXB0- RXB1+ RXB1- RXB2+ RXB2- RXB3+ RXB3- RXB4+ RXB4-
RXACK+ RXACK- RXBCK+ RXBCK-
MODEL_OPT_3 MODEL_OPT_4 MODEL_OPT_5
OLP TP100
applied on only SMALL PCB

NAND_FLASH_1G_HYNIX

EAN35669102
IC102-*1
H27U1G8F2BTR-BC

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 R/B RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

NAND_FLASH_1G_SS

EAN61857001
IC102-*2
K9F1G08U0D-SCB0

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 R/B RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

NAND_FLASH_1G_TOSHIBA

EAN61508001
IC102-*3
TC58NVG0S3ETA0BBBH

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 RY/BY RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O8 I/O7 I/O6 I/O5 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

NAND_FLASH_2G_HYNIX

EAN60708701
IC102-*4
HY27UF082G2B-TPCB

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 R/B RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

UO4_LGE2111A-TE

IC101-*1
LGE2111A-TE

UO4_LGE2111A-T8

IC101-*2
LGE2111A-T8

UO4_LGE2111A-VD

IC101-*3
LGE2111A-VD

C7 E6 F5 B6 E5 D5 B7 E7 AB5 A9 F4 AB1 N6 AB2 AC2
GPIO36 GPIO37 GPIO38 GPIO39 GPIO40 GPIO41 GPIO42 GPIO45 GPIO46 GPIO49 GPIO50 GPIO51 GPIO52 I2C_SCKM0/GPIO53 I2C_SDAM0/GPIO54 GPIO73 GPIO74
LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N LVACKP LVACKN LVBCKP LVBCKN GPIO196 GPIO193 GPIO194 GPIO195
AB25 AB23 AC25 AB24 AD25 AC24 AE23 AC23 AC22 AD23 V23 U24 V25 V24 W25 W23 AA23 Y24 AA25 AA24 AE24 AD24 Y23 W24 T25 U23 T24 T23

THE ⚠SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠SYMBOL MARK OF THE SCHEMETIC.

SECRET
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LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110511
BLOCK	FLASH/EEPROM/GPIO	SHEET	1

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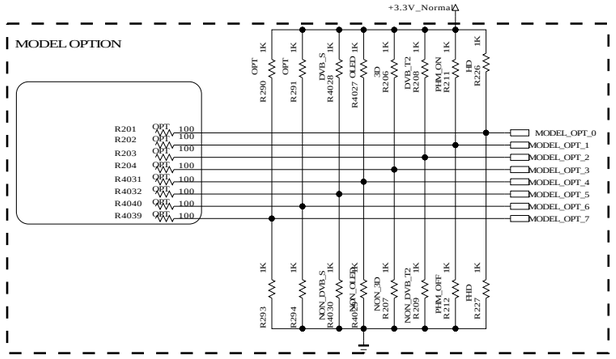
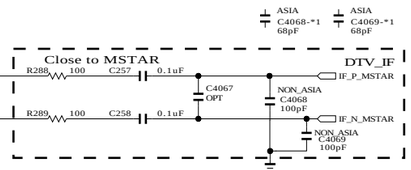
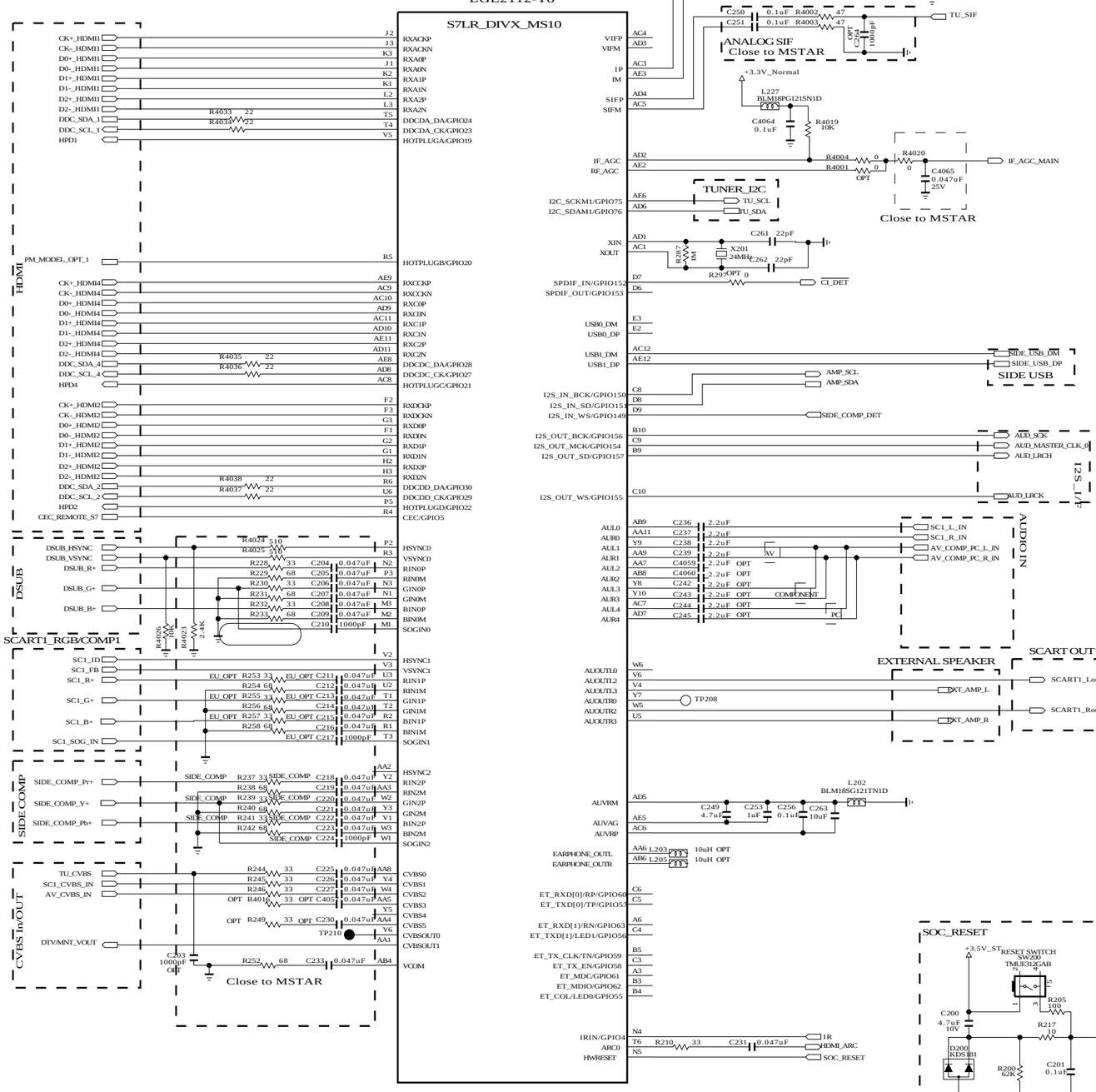
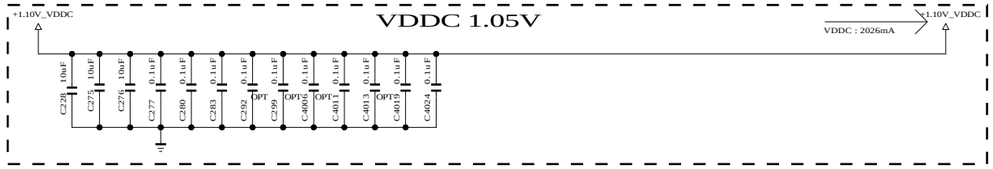
MODEL OPTION

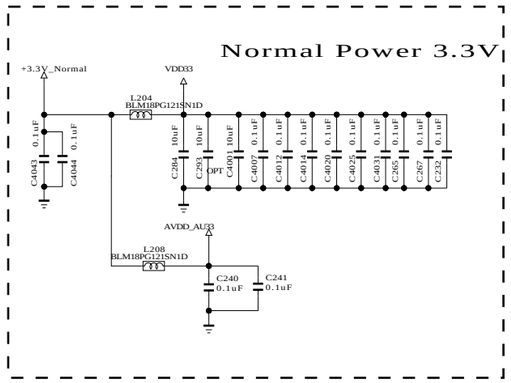
PIN NAME	PIN NO.	LOW	HIGH
MODEL_OPT_0	AB3	FHD	HD
MODEL_OPT_1	F4	PHM_OFF	PHM_ON
MODEL_OPT_2	AB2	NON_DVB_T2	DVB_T2
MODEL_OPT_3	T25	NON_3D	3D
MODEL_OPT_4	U23	NON_OLED	OLED
MODEL_OPT_5	T24	NON_DVB_S	DVB_S
MODEL_OPT_6	B8	READY	READEY
MODEL_OPT_7	A8	READY	READY

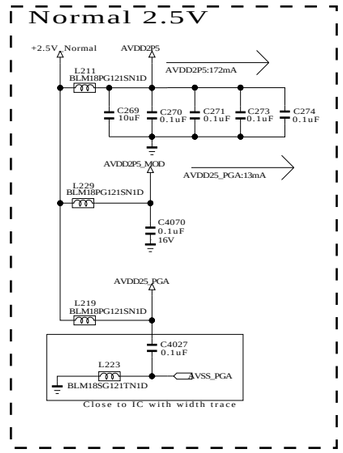


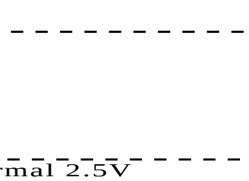


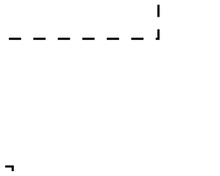


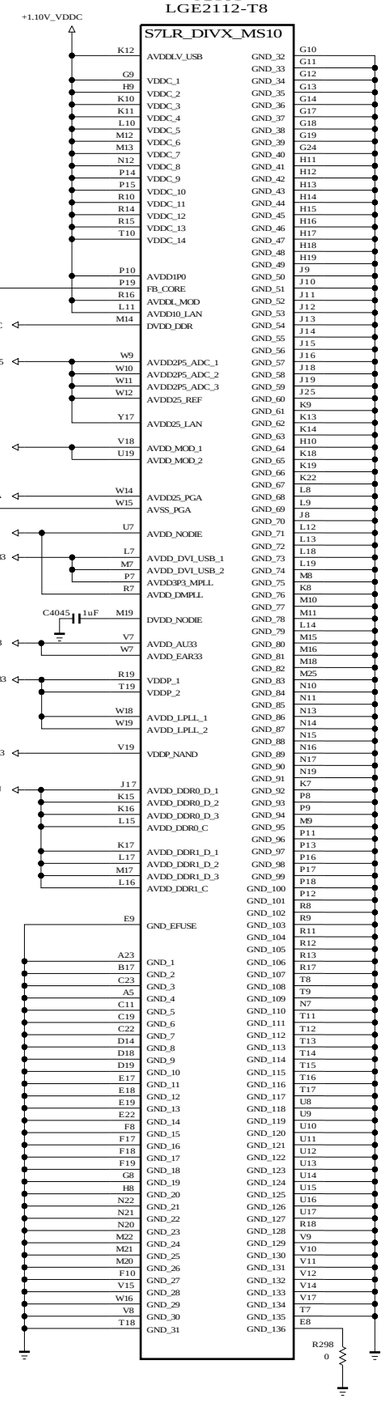












THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET

LGElectronics

LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110511
BLOCK	MAIN2, HW OPT	SHEET	2

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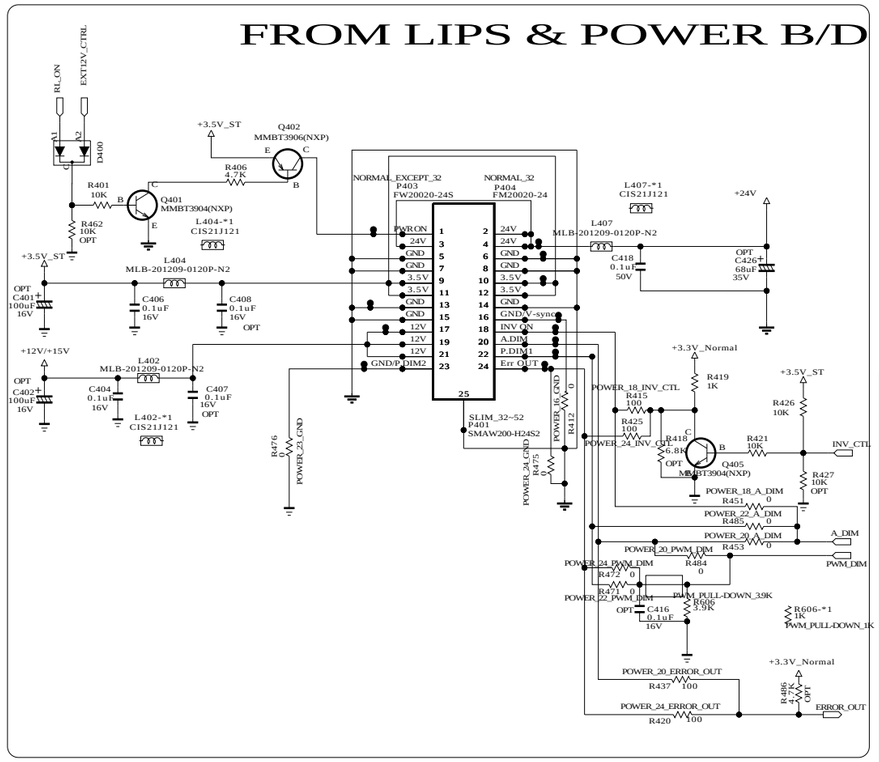
FROM LIPS & POWER B/D



<MODULE PIN MAP>

PIN No	LGD(PSU) or LIPS	CMO10"Lamp (PSU)	AUO 10"Lamp (PSU)	SHARP (PSU)	IPS-@ (PSU)
16	GND	GND	GND	GND	GND
18	INV_ON	A-DIM	INV_ON	INV_ON	INV_ON
20	VBR-A	NC	Err_out	52/60:ERROR 26/32HD:NC	Err_out
22	PWM_DIM	PWM_DIM	NC	26/32/52:PWM 60:NC	NC
24	Err_out	INV_ON	PWM_DIM	26/32/52:GND 60:PWM	PWM_DIM
23	GND	GND	GND	GND	GND

<LED MODULE PIN MAP -> latest update 20100618>

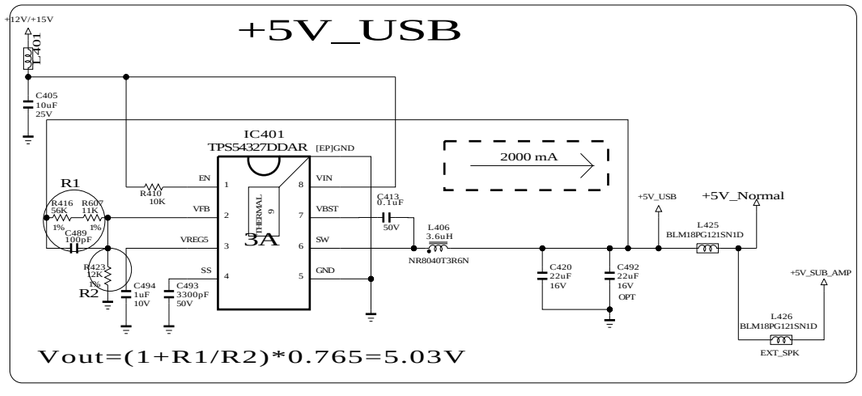
PIN No	LGD LPB/ OS LPB	32LE5300-TA CMO10"LED (PSU)	32LE4500-TA AUO 10"LED (PSU)	32LE5300-TA LGD 10"LED (PSU)	
16	NC	NC	NC	NC	
18	INV_ON	INV_ON	INV_ON	INV_ON	
20	NC	err_out --> NC	err_out --> NC	NC	
22	PWM_DIM	NC	NC	PWM_DIM	
24	err_out --> NC	PWM_DIM	PWM_DIM	err_out --> NC	
23	NC	NC	NC	NC	

LGD edge led error-out use or not? checking is necessary...

<Module Inv to Main Pin Connection>

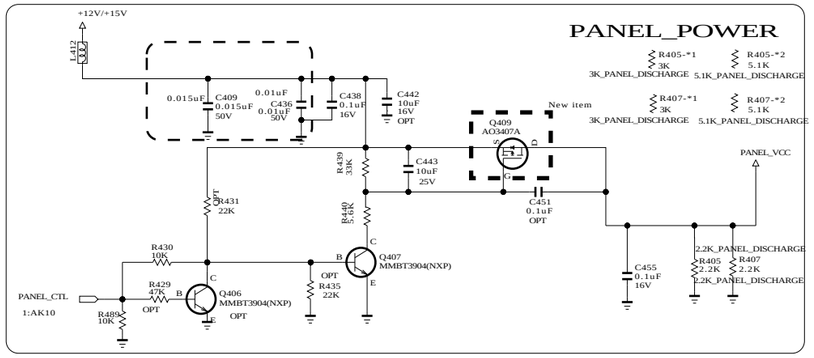
INV <--> MAIN
#11 <--> #24
#12 <--> #18
#13 <--> #20
#14 <--> #22

+5V_USB

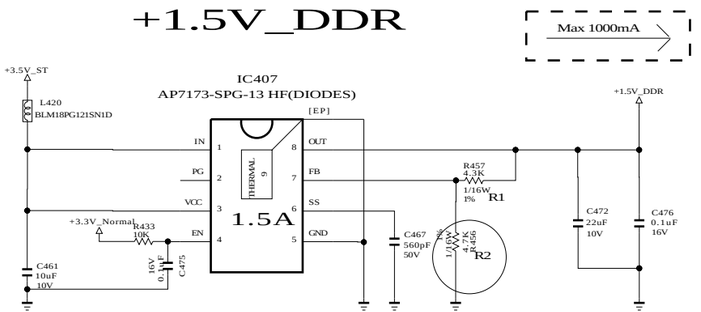


Vout=(1+R1/R2)*0.765=5.03V

PANEL_POWER

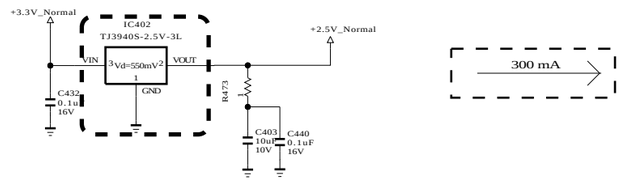


+1.5V_DDR

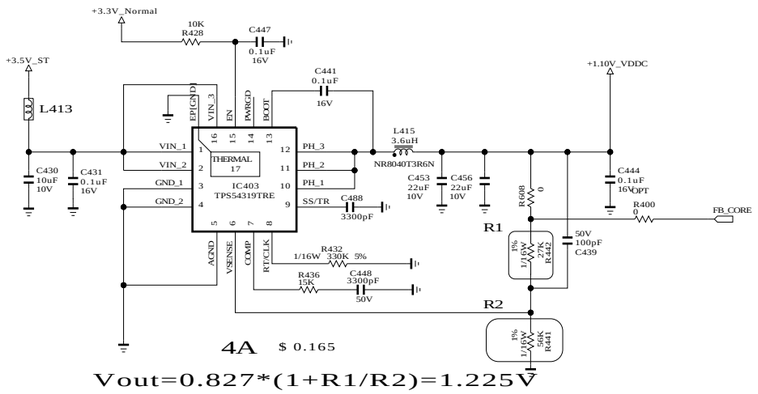


Vout=0.8*(1+R1/R2)=1.5319

+2.5V/+1.8V



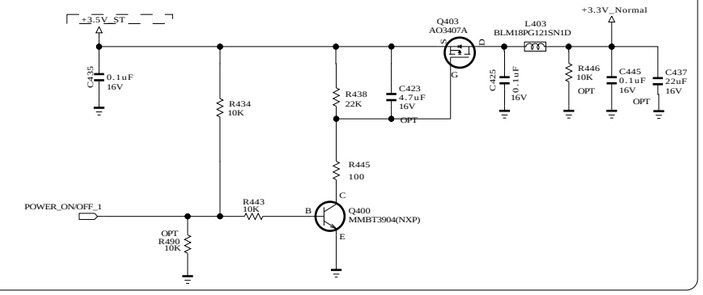
S7LR core 1.2V volt



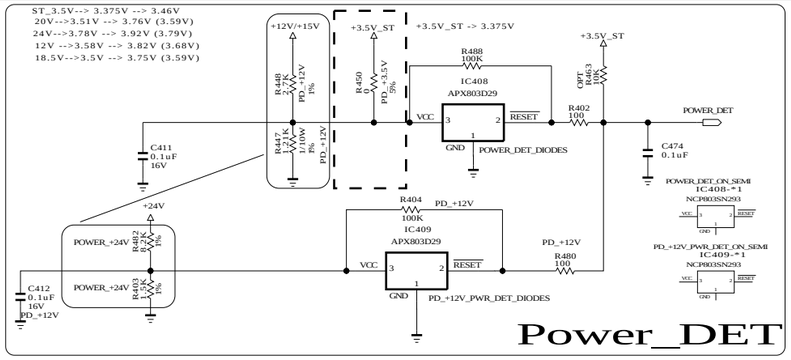
Vout=0.827*(1+R1/R2)=1.225V

+3.3V_Normal

780 mA

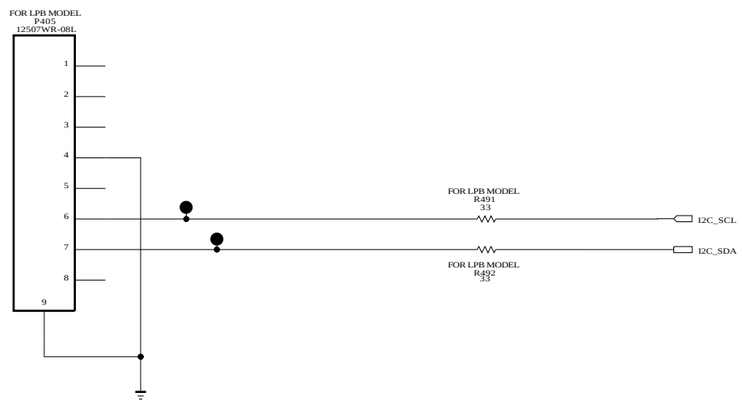


Power_DET



FOR LPB Download

[To LED DRIVER]



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	POWER_LARGE	SHEET	4 /

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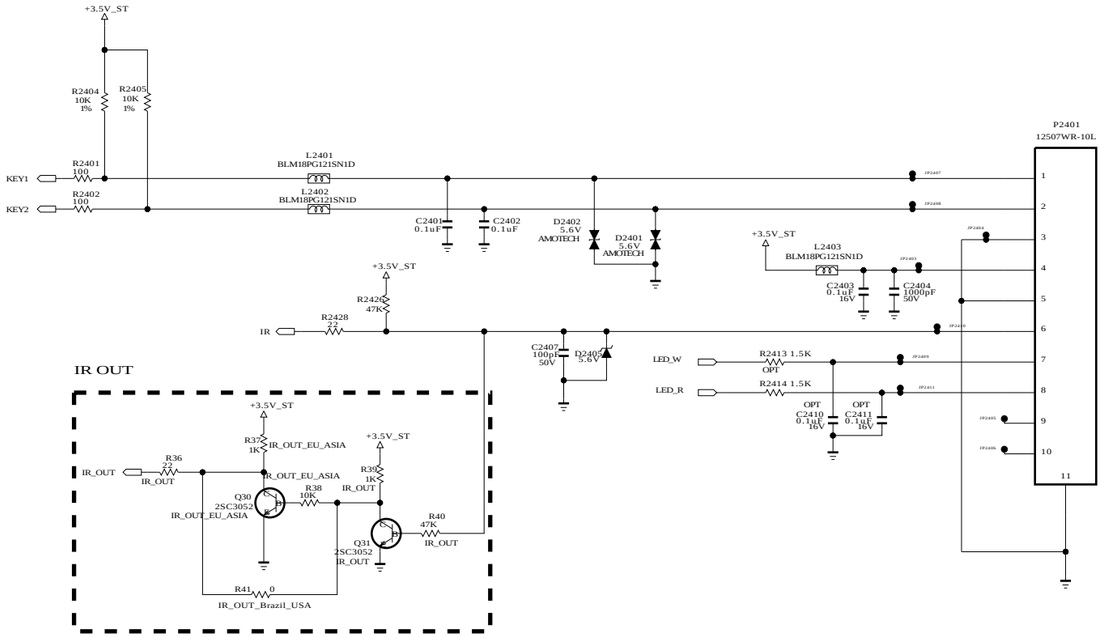
CONTROL

IR & LED



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LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110324
BLOCK	IR/CONTROL-L	SHEET	6 /

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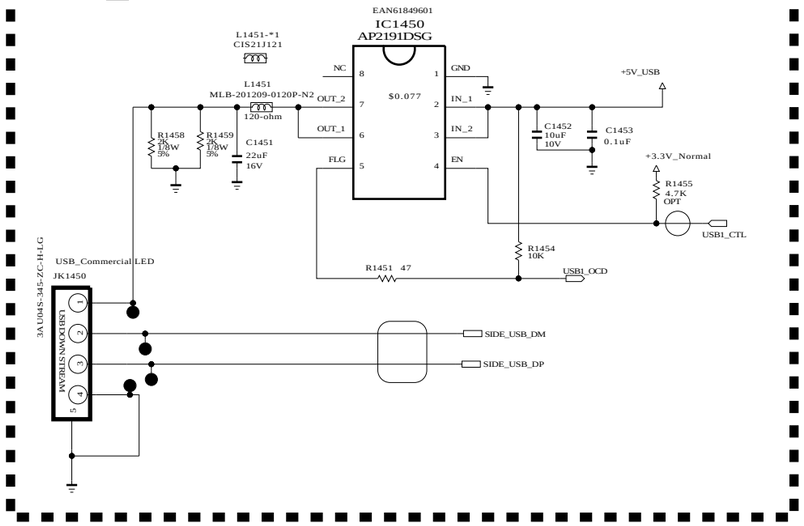
USB_DIODES



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MODEL	GP2R	DATE	20101023
BLOCK	USB_OCP_DIODE	SHEET	7 /

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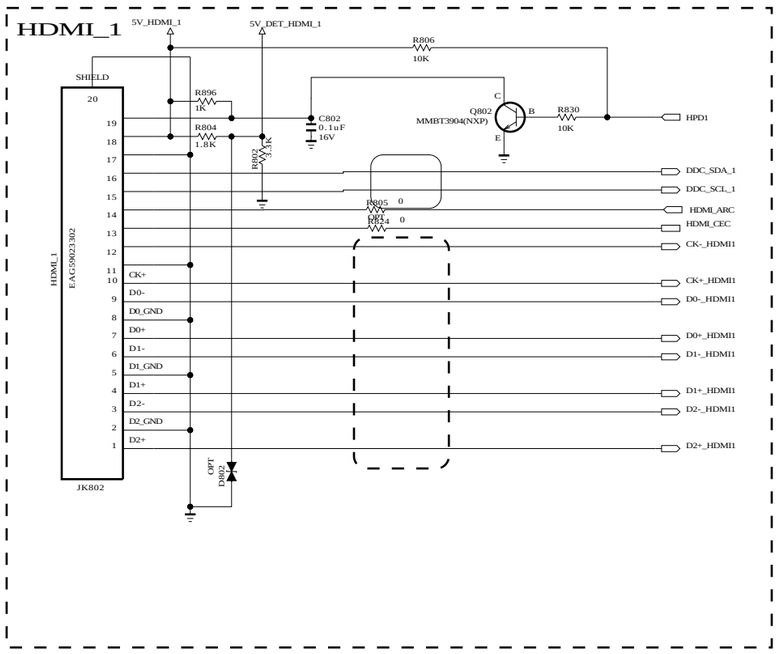
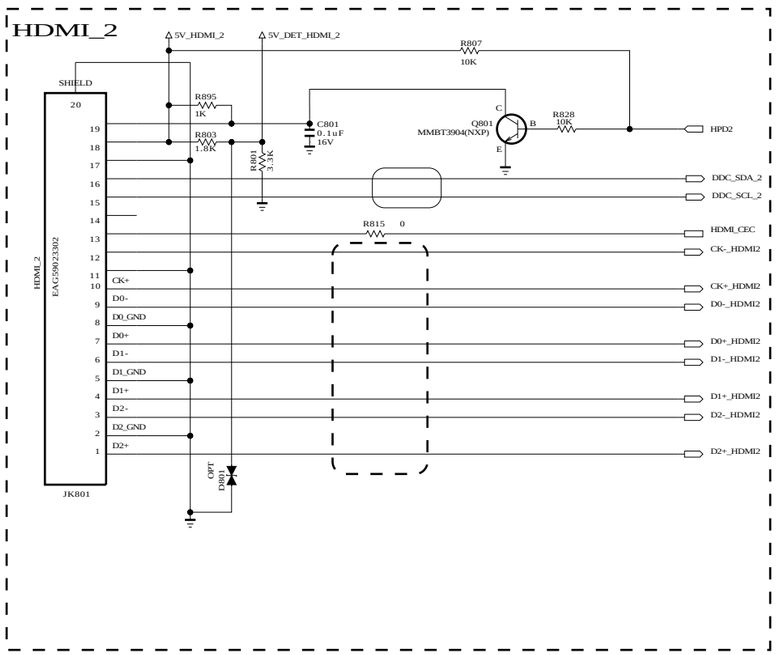
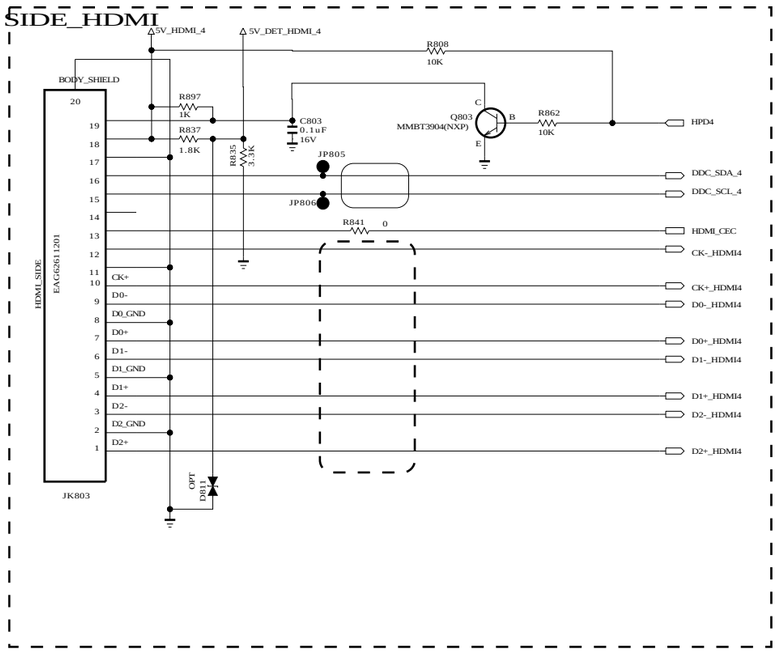
HDMI_1



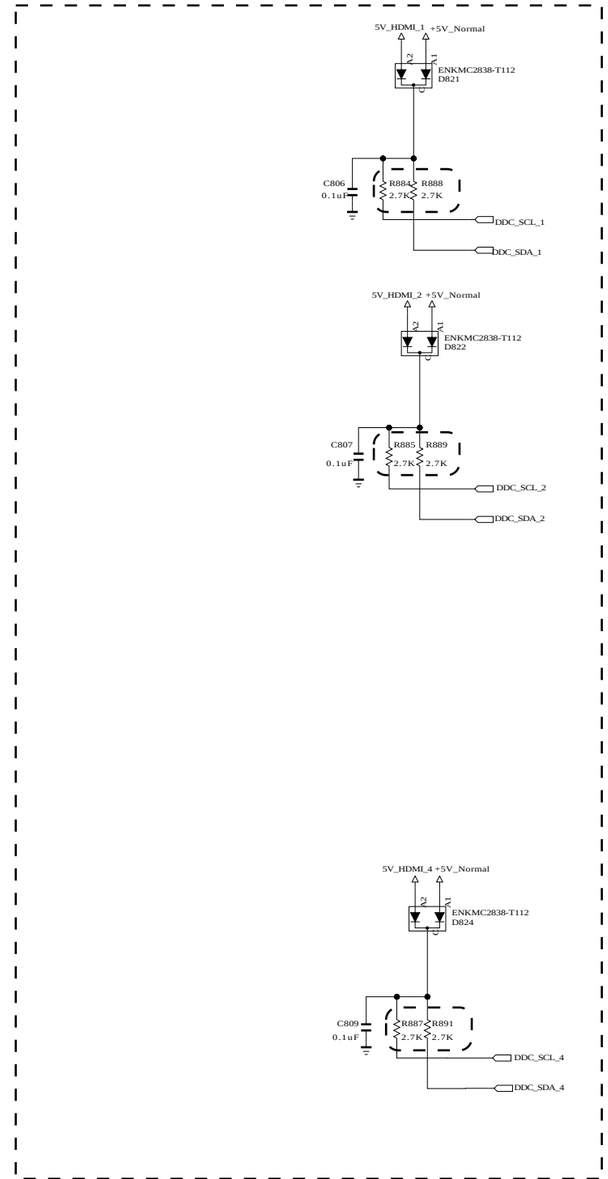
HDMI_2



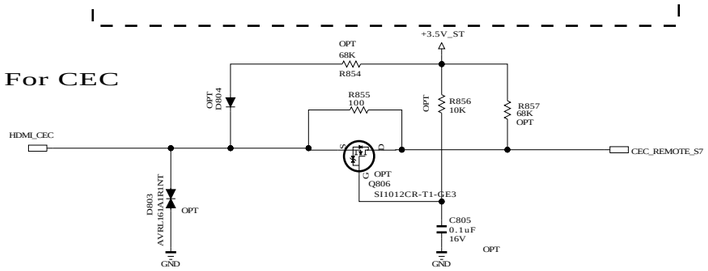
SIDE_HDMI



HDMI EEPROM



For CEC



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	HDMI	SHEET	8 /

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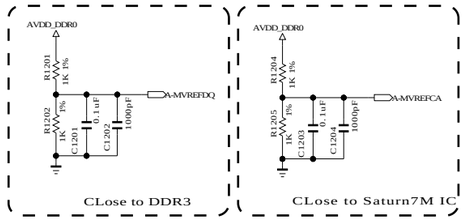

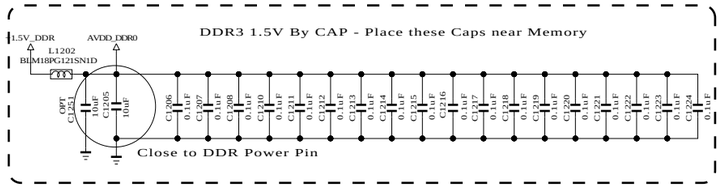

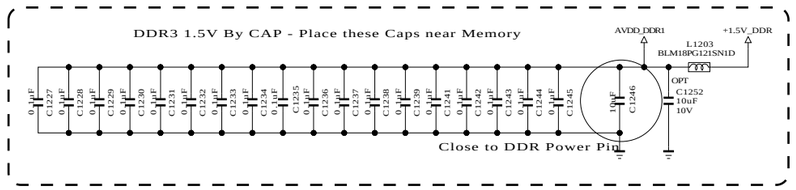

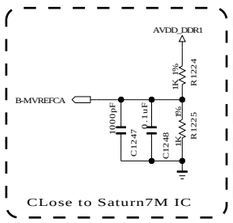

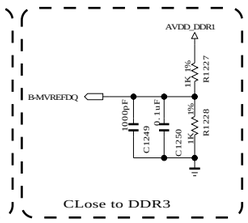

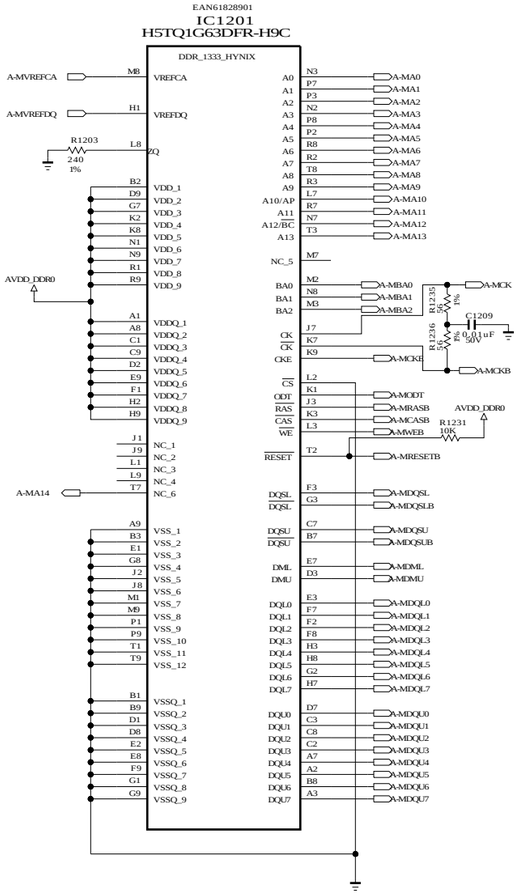

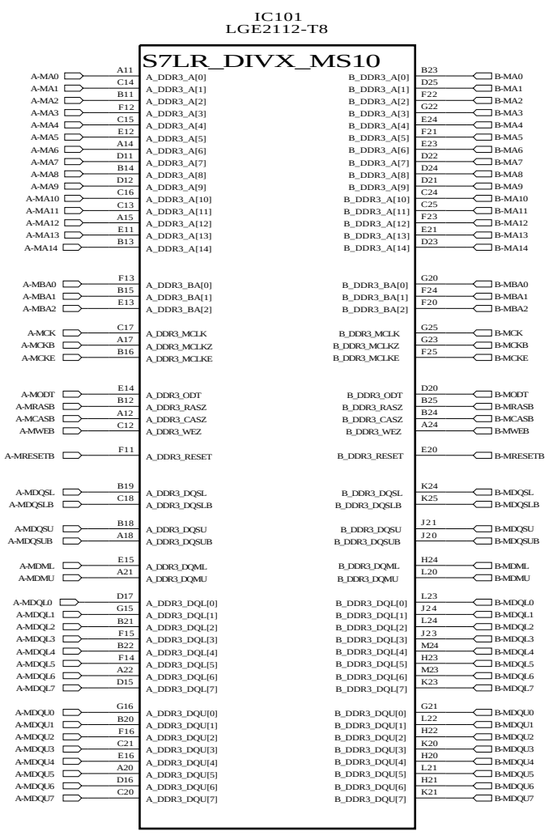

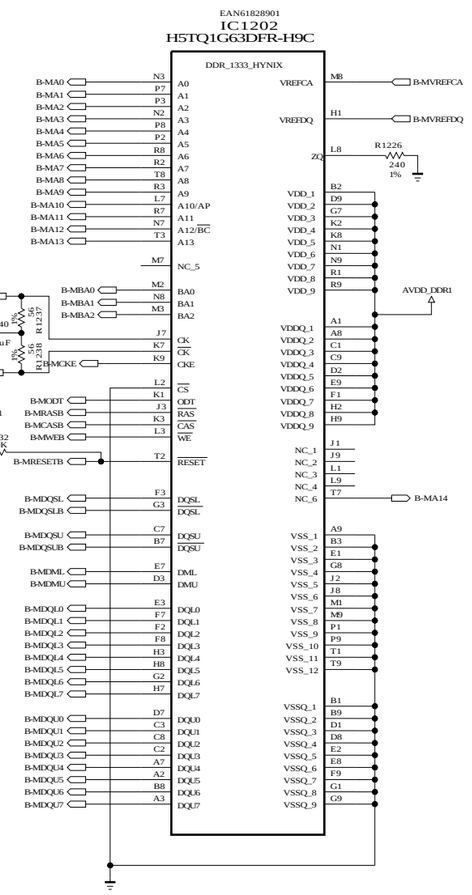

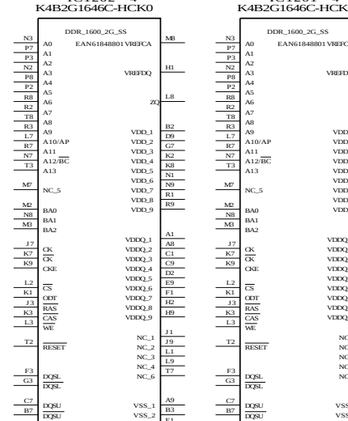

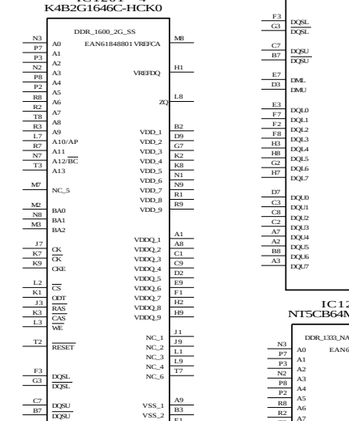

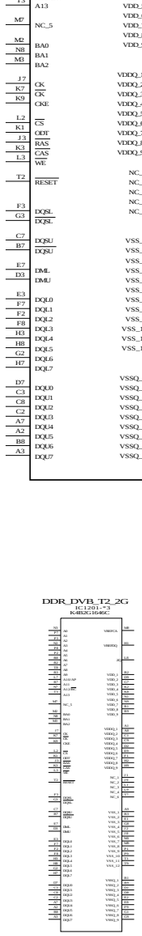

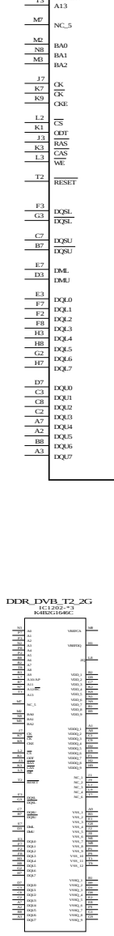

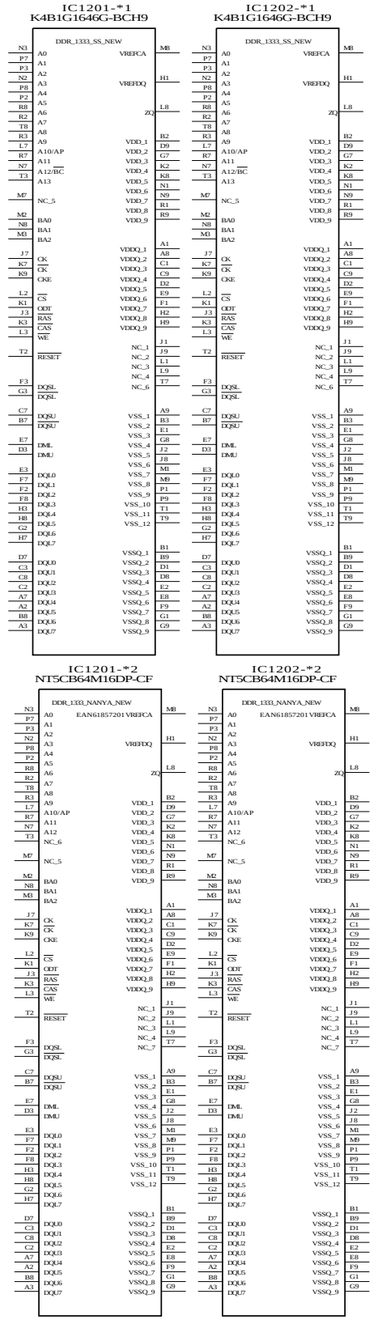

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MODEL	GP3_S7LR	DATE	20110511
BLOCK	DDR_256	SHEET	12 /

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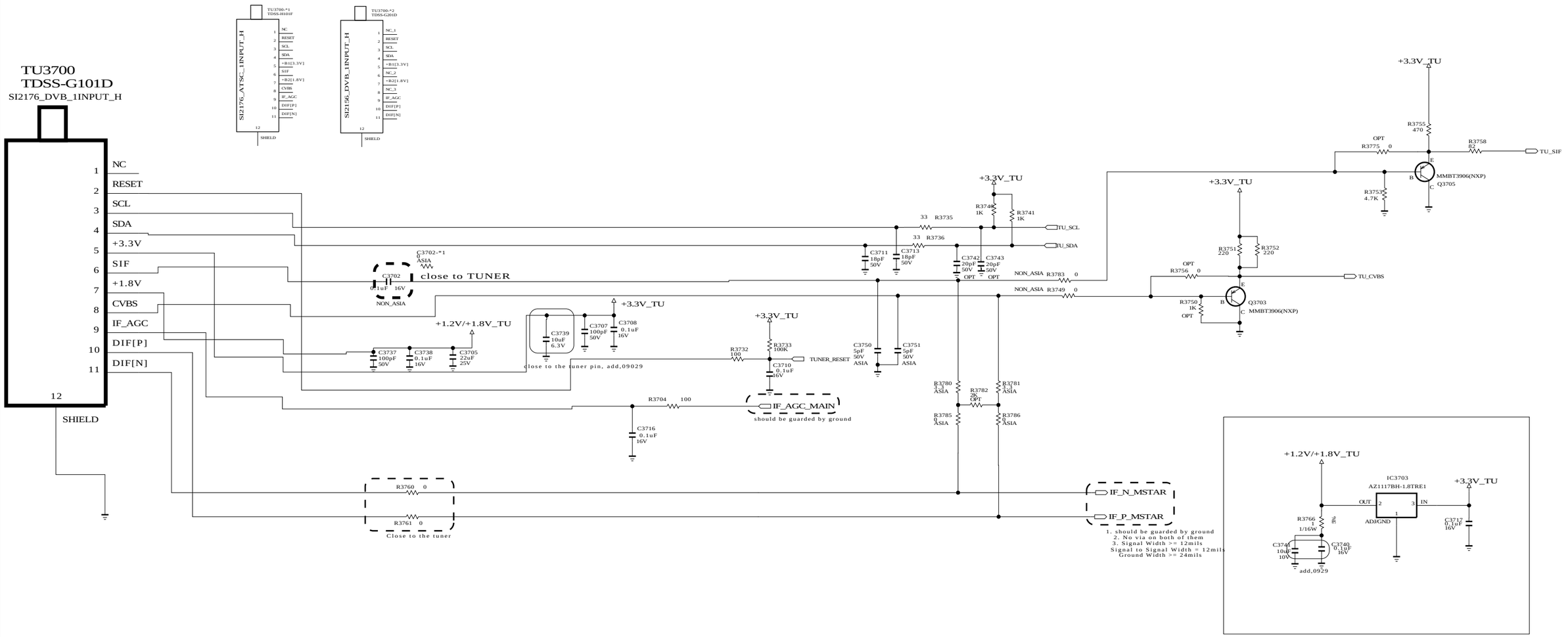
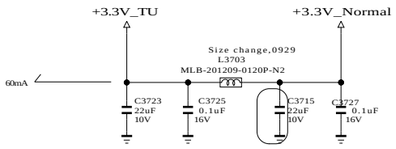
P4R_GLOBAL_TUNER_BLOCK





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MODEL	GP3_S7LR	DATE	20110511
BLOCK	TUNER_L	SHEET	14

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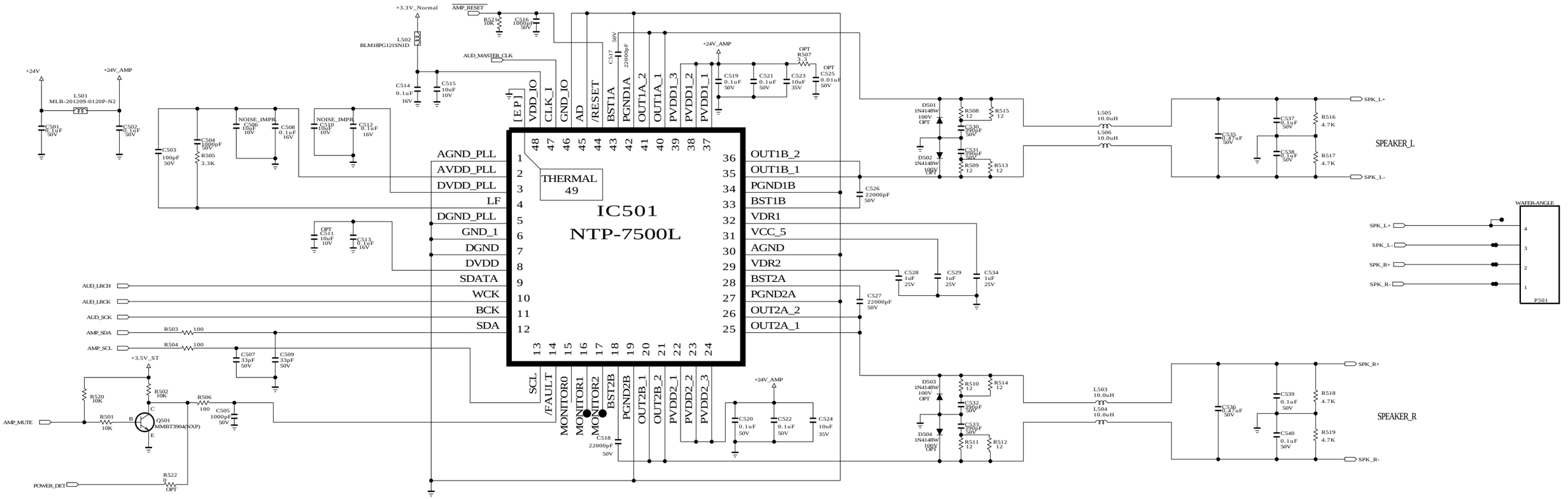

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MODEL	GP3 S7LR	DATE	20110324
BLOCK	NTP7400	SHEET	16 /

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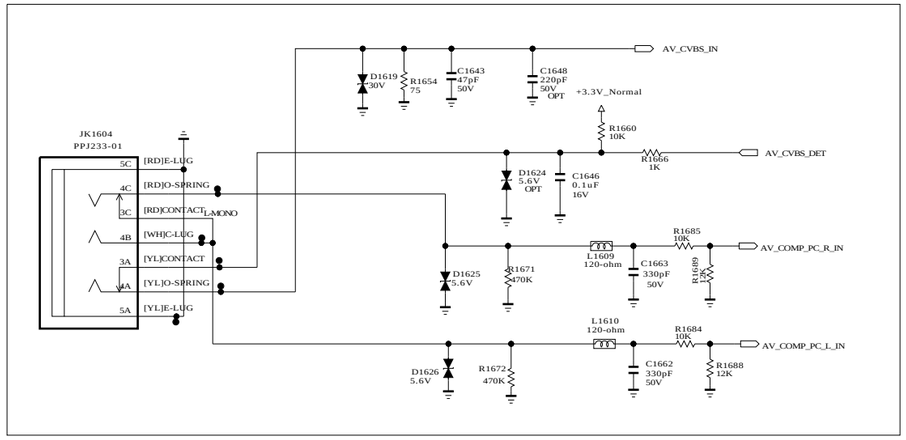
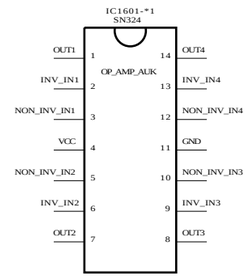
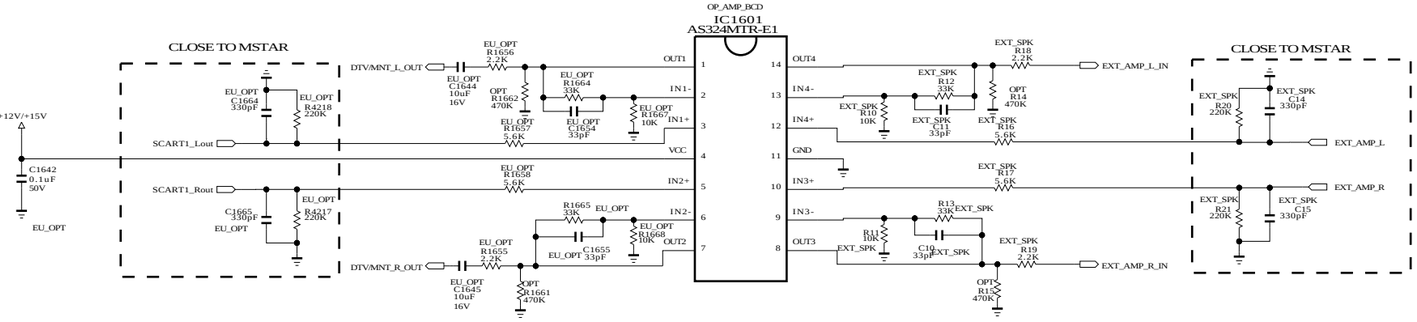
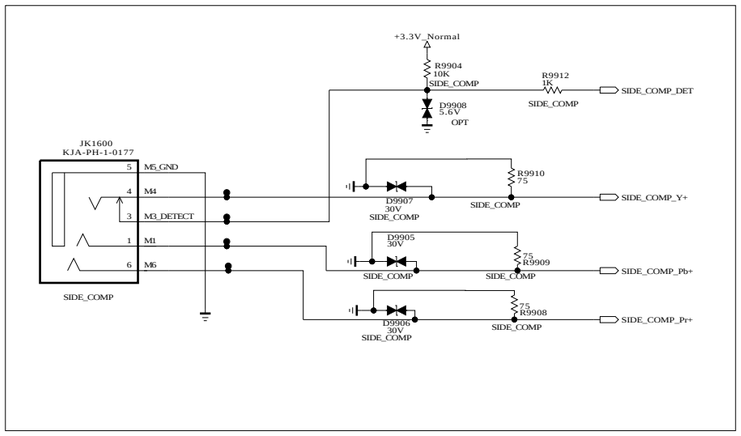
Rear AV



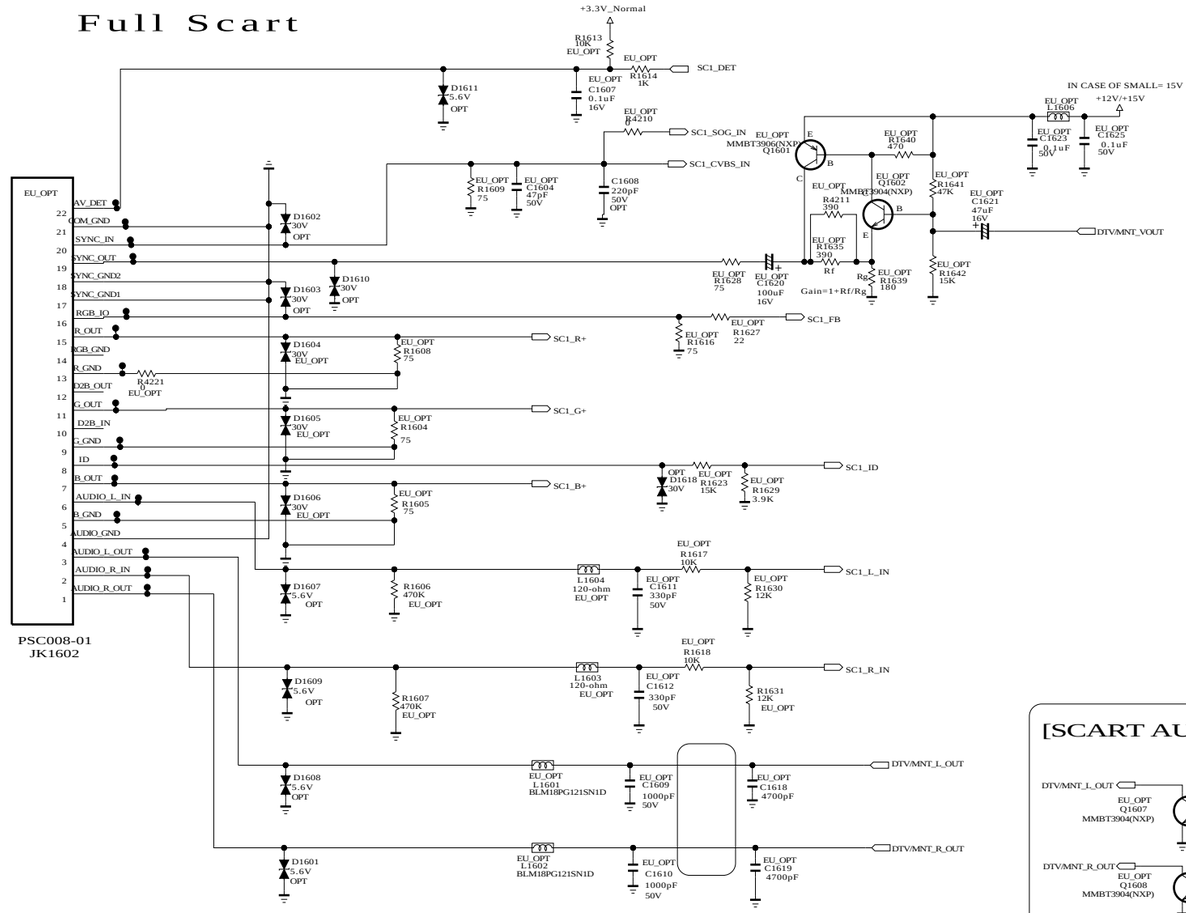


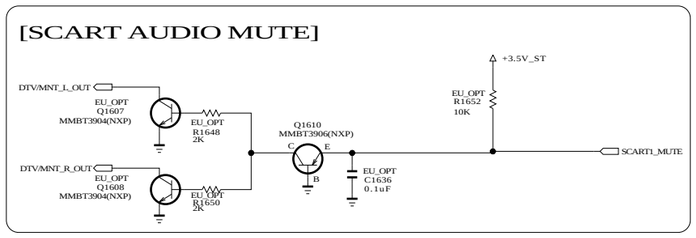


SIDE COMPONENT PHONE JACK



Full Scart





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LG ELECTRONICS

MODEL	GP3 S7LR	DATE	20110324
BLOCK	REAR JACK	SHEET	17 /

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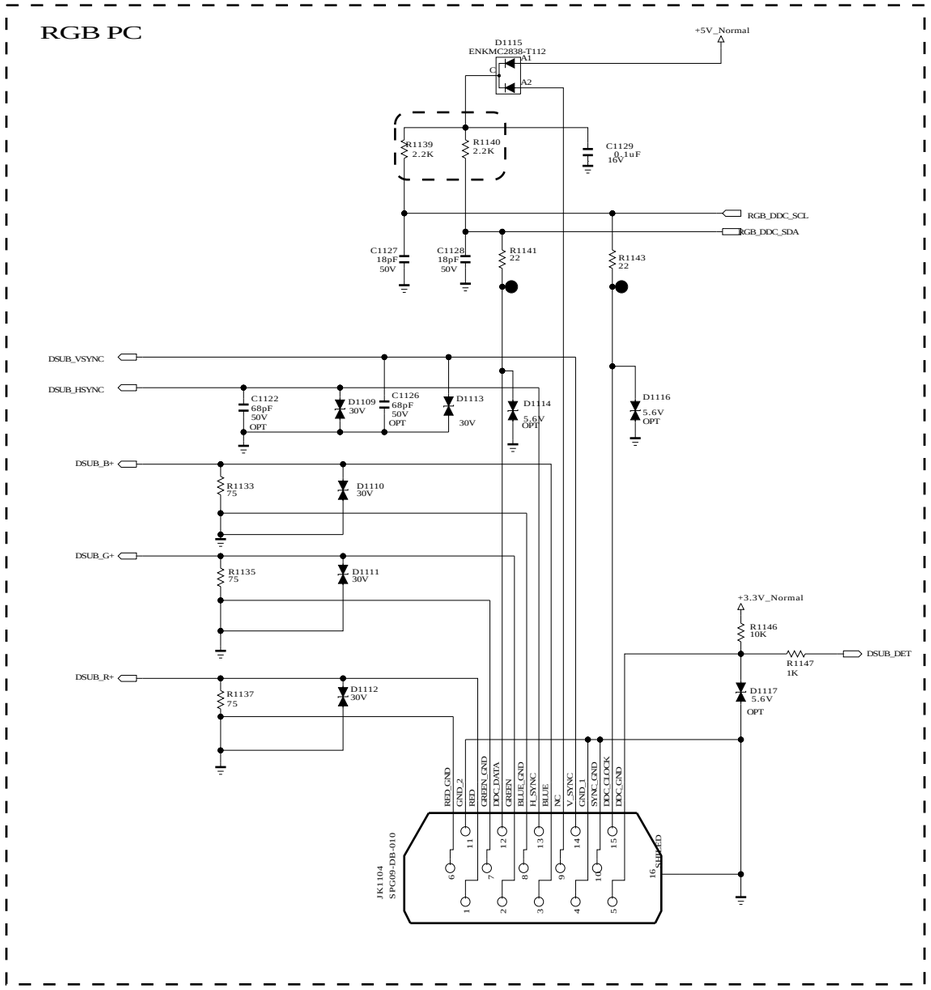
RGB



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	RGB/SPDIF/HP	SHEET	9

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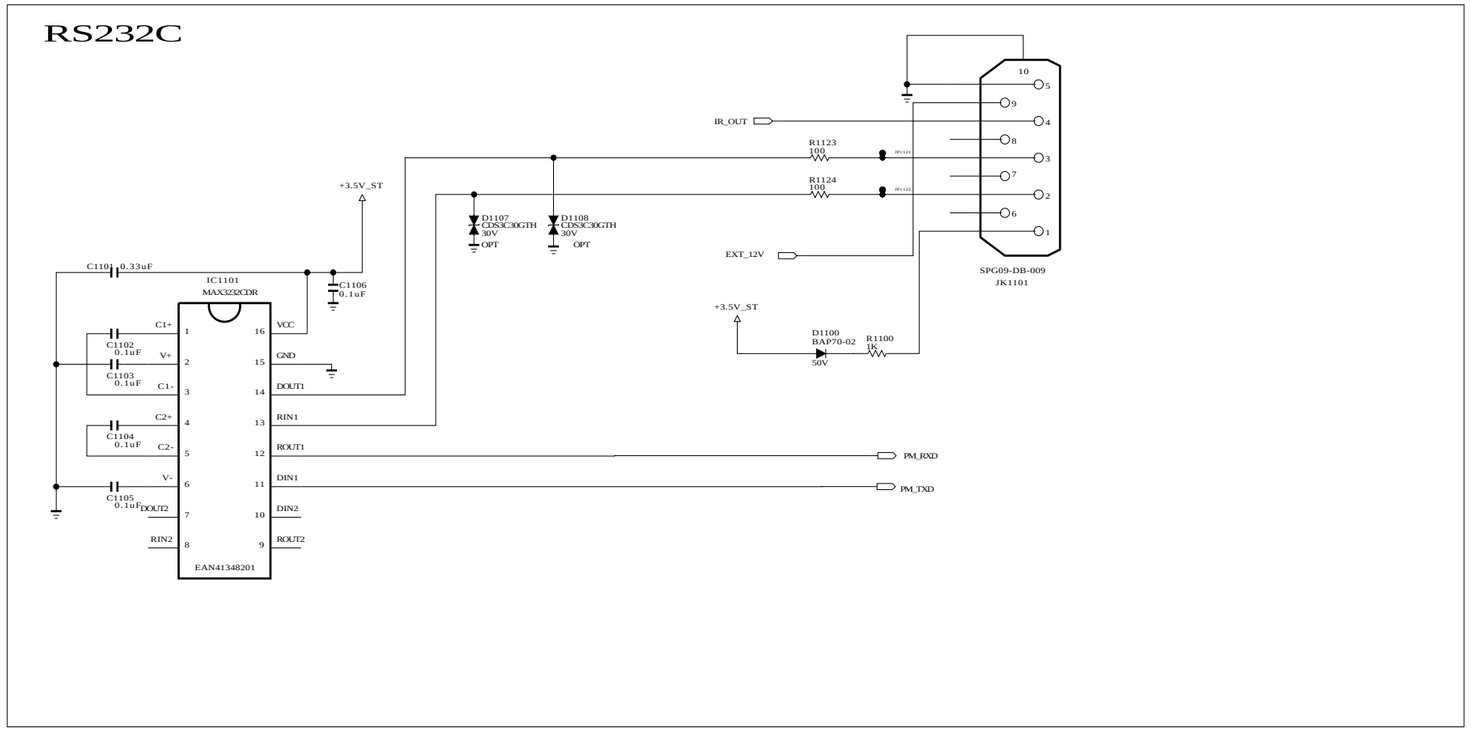
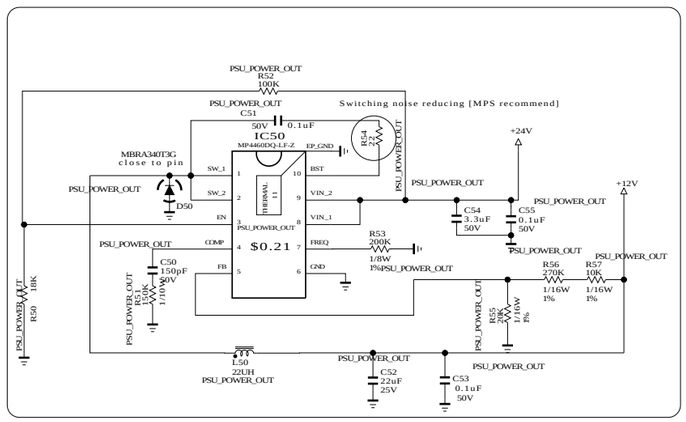
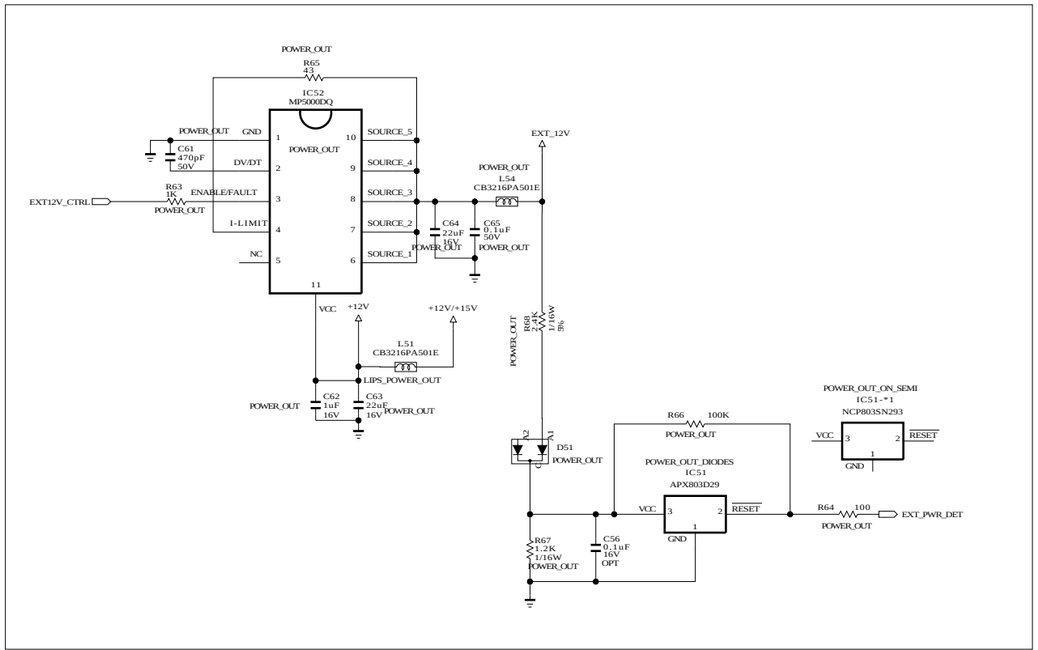


12V EXT PowerOut

DC DC CONVERTER +12V_ONLY PSU

(For External power)





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MODEL	GP3_S7LR	DATE	20110324
BLOCK	RS232C_9PIN	SHEET	10 /

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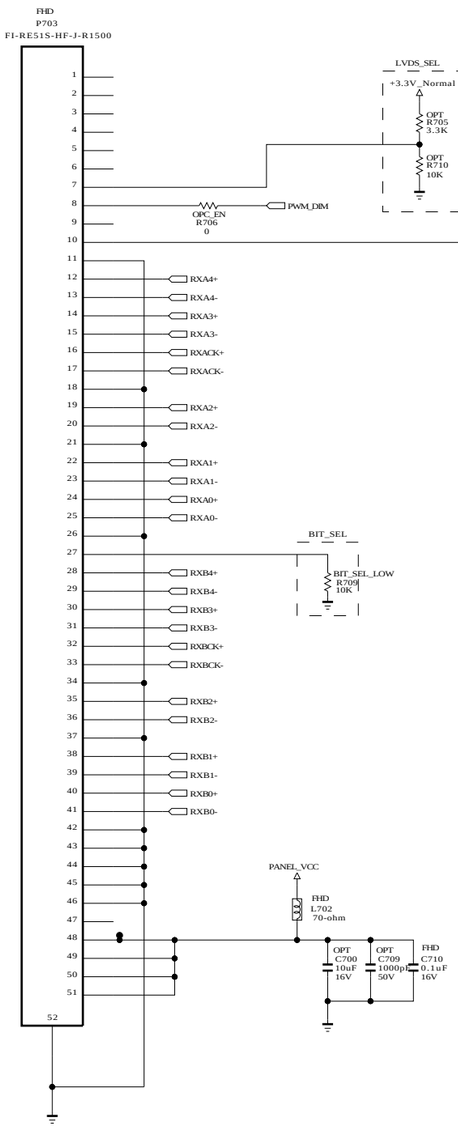
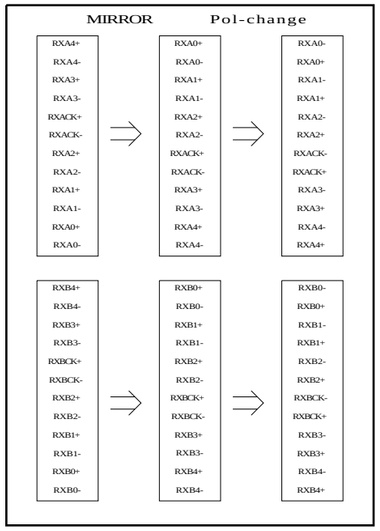
LVDS for large inch

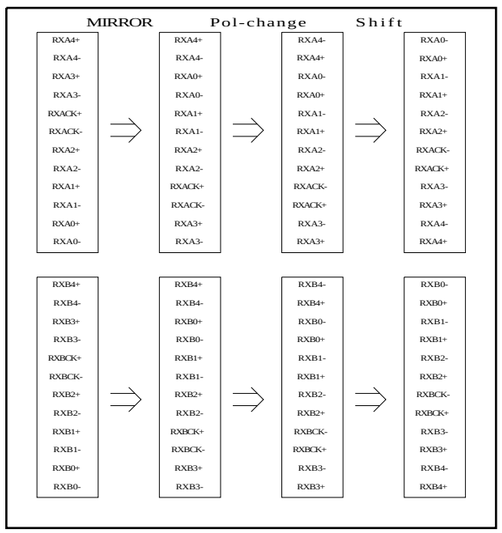
[51Pin LVDS Connector] (For FHD 60Hz)



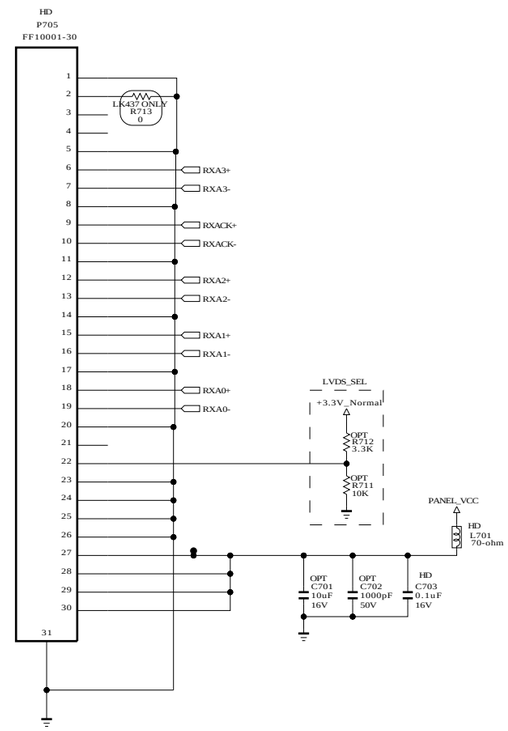
FOR FHD REVERSE(10bit)
Change in S7LR


MIRROR
Pol-change
RXA4+ RXA4- RXA3+ RXA3- RXACK+ RXACK- RXA2+ RXA2- RXA1+ RXA1- RXA0+ RXA0-
RXA0+ RXA0- RXA1+ RXA1- RXA2+ RXA2- RXACK+ RXACK- RXA3+ RXA3- RXA4+ RXA4-
RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+ RXA4- RXA4+
RXB4+ RXB4- RXB3+ RXB3- RXBCK+ RXBCK- RXB2+ RXB2- RXB1+ RXB1- RXB0+ RXB0-
RXB0+ RXB0- RXB1+ RXB1- RXB2+ RXB2- RXBCK+ RXBCK- RXB3+ RXB3- RXB4+ RXB4-
RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+ RXB4- RXB4+

FOR FHD REVERSE(8bit)
Change in S7LR


MIRROR
Pol-change
Shift
RXA4+ RXA4- RXA3+ RXA3- RXACK+ RXACK- RXA2+ RXA2- RXA1+ RXA1- RXA0+ RXA0-
RXA4+ RXA4- RXA0+ RXA0- RXA1+ RXA1- RXA2+ RXA2- RXACK+ RXACK- RXA3+ RXA3-
RXA4- RXA4+ RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+
RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXACK- RXACK+ RXA3- RXA3+ RXA4- RXA4+
RXB4+ RXB4- RXB3+ RXB3- RXBCK+ RXBCK- RXB2+ RXB2- RXB1+ RXB1- RXB0+ RXB0-
RXB4+ RXB4- RXB0+ RXB0- RXB1+ RXB1- RXB2+ RXB2- RXBCK+ RXBCK- RXB3+ RXB3-
RXB4- RXB4+ RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+
RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXBCK- RXBCK+ RXB3- RXB3+ RXB4- RXB4+

[30Pin LVDS Connector] (For HD 60Hz_Normal)



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	LVDS_LARGE	SHEET	11

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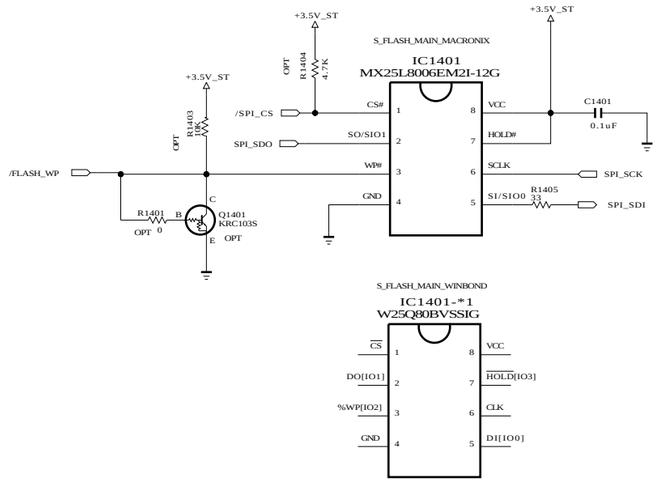

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MODEL	GP3 S7LR	DATE	20110324
BLOCK	SFLASH	SHEET	13 /

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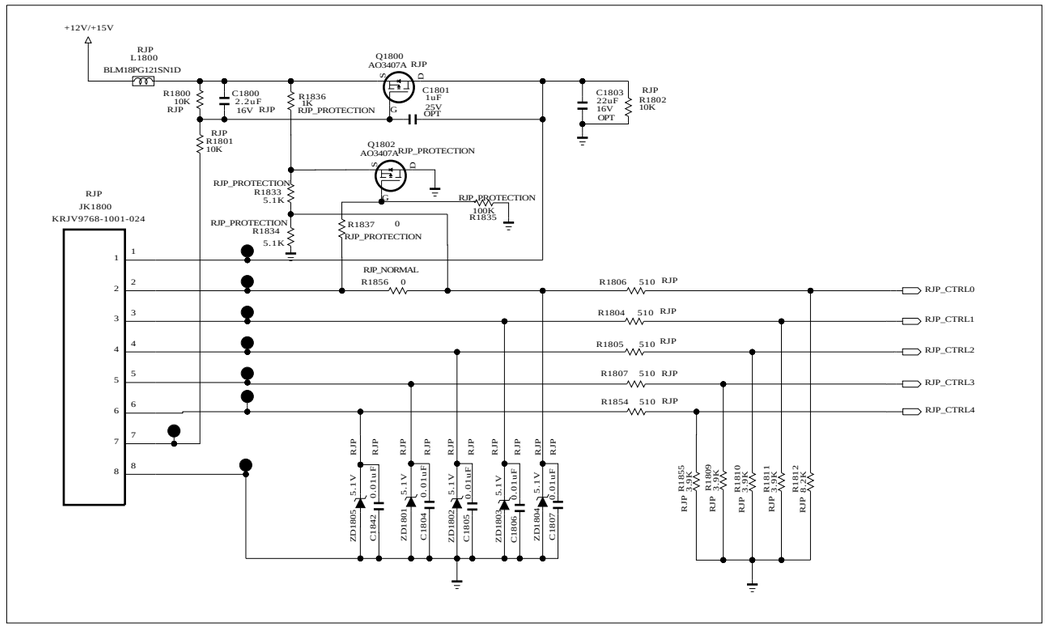
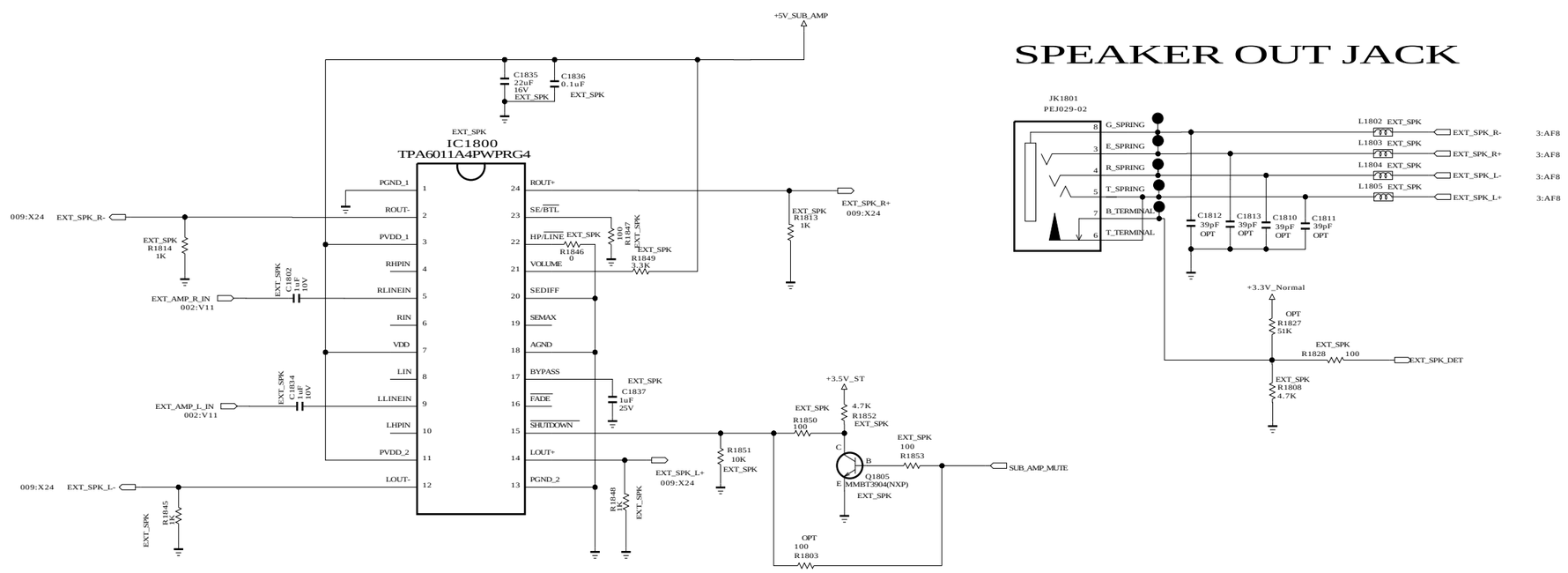


EXT_SPEAKER_AMP



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	SIDE_JACK	SHEET	18 /

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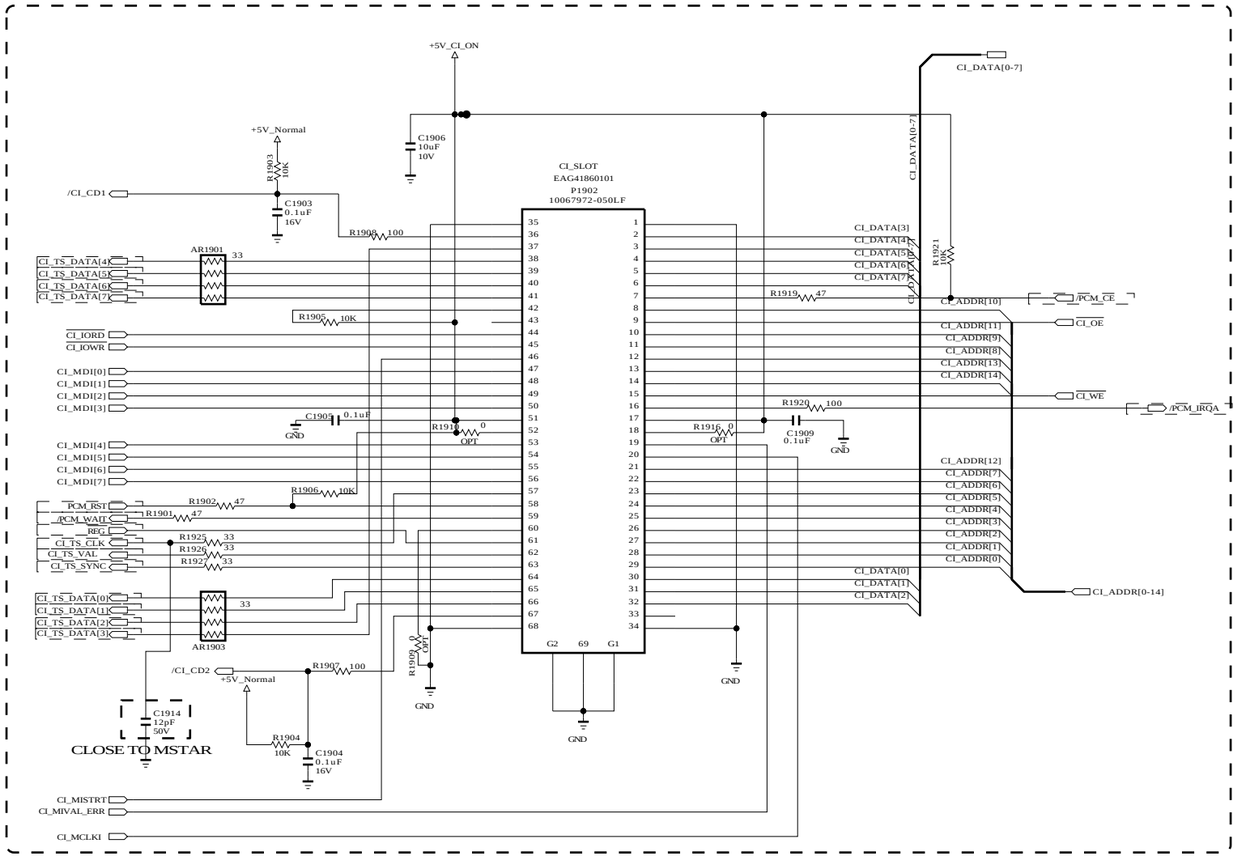
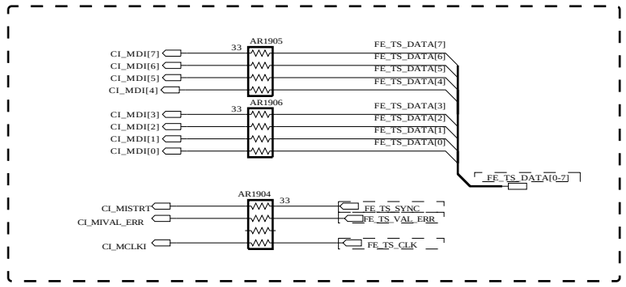
CI Region

* Option name of this page : CI_SLOT (because of Hong Kong)

CI SLOT



CI TS INPUT



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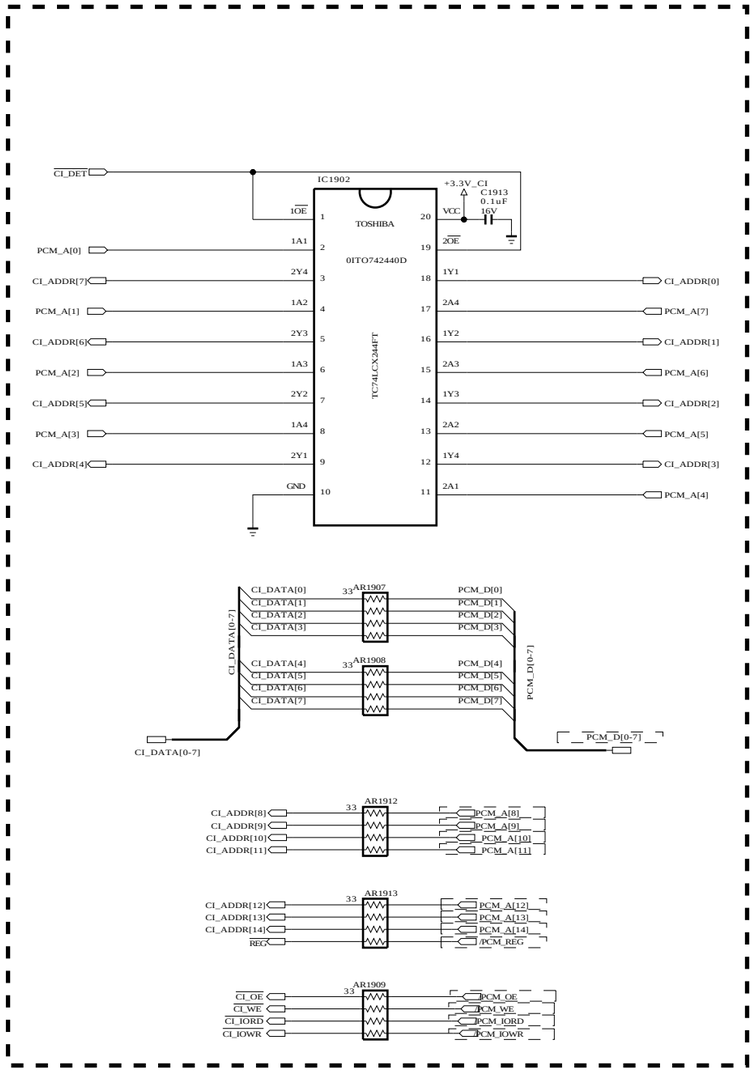
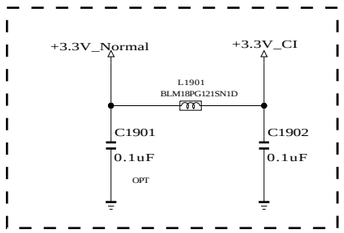
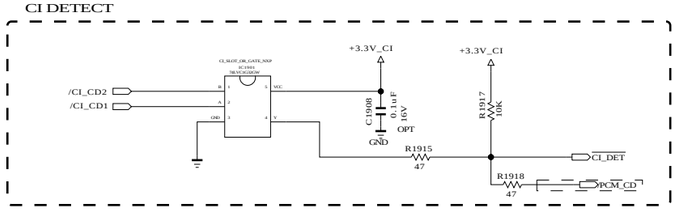
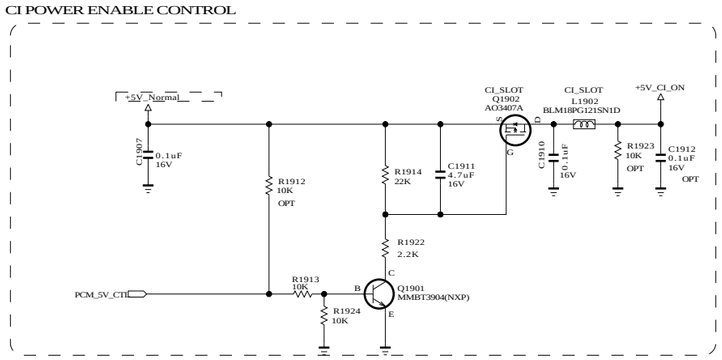




CI DETECT



CI POWER ENABLE CONTROL



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MODEL	GP3_S7LR	DATE	20110324
BLOCK	PCMCI	SHEET	20 /

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